



# INPUT<sup>®</sup>

# Research

# Bulletins

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## Systems Integration Program Executive Research Bulletins

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## Bulletin

### IBM Application Solutions Line of Business

Industry-specific solutions continue to be the major thrust within the IBM Applications Solutions Line of Business (ASLoB). In late 1989 ASLoB made a number of organizational changes to clarify responsibility and accountability and to strengthen its ability to deliver vertical-industry solutions. Earlier in the fourth quarter, IBM's U.S. Marketing and Services organization also initiated a field test to move systems integration implementation and professional resources directly into the field sales organization.

On December 13, 1989, the ASLoB was reshaped and its three customer sector organizations were made IBM Divisions and their missions were expanded. Each of these divisions now has the resources and responsibility for worldwide solutions development for a specific set of vertical-industry markets. The three divisions and their presidents are:

Industry Sector Division—President,  
Edward J. Kfoury,

Services Sector Division—President,  
Marvin L. Mann

Academic, General and Public Sector  
Division—President, Lucie Fjelstad

As part of these organizational changes, IBM also changed the name and mission of ASD, formerly Applications Systems Division, to the Application Solutions Division. Joseph M. Guglielmi is still the president of this division, but its mission now is to

provide cross-industry solutions, rather than the broad responsibility for being the application provider for all vertical industries. This latter mission, as explained earlier, is now the responsibility of three industry sector divisions.

IBM's new ASD will be responsible for developing and providing market support for major worldwide solutions that have cross-industry application. Major cross-industry solution areas include image processing, artificial intelligence, and office solutions.

The Systems Integration Division (SID), whose president is Gerald W. Ebker, was also affected by this change. Solution development activities that SID previously provided for the industry sectors—with the exception of an aerospace-focused computer-integrated manufacturing (CIM) mission in Owego, New York—now report to the sector divisions. SID has provided a valuable service to IBM by building experienced and skilled solution development resources that are now being integrated into the commercial sector divisions.

ASLoB is also experimenting with moving SID's Professional Services unit, IBM's major resource for tactical systems integration and professional services, directly into the field sales organization. Currently underway is a field test that moves these resources directly under Field Operations Area management in two of the twelve or so field marketing areas. If this change

goes well—and there is no reason to believe it won't—the remainder of Professional Services will move into Field Operations later this year.

When the organizational changes are complete, INPUT expects that SID's responsibilities will be refocused on federal systems integration activities and IBM's defense and aerospace business. All IBM commercial systems integration resources will be in the field sales organization, and relations with SI partners will be managed through the sector divisions and the new ASD.

The responsibilities of the sector divisions will include:

- Marketing Programs—identifying industry solutions requirements, providing marketing support, establishing industry strategies, and providing skilled field support
- Channel Strategies—identifying business partner support requirements and establishing vendor alliances
- Solution Development—establishing industry architectures and developing products. As part of the December 13 announcement, ASD's software development laboratories were reassigned to the sector divisions or ASD based on industry mission.

In summary, ASLoB now contains four divisions with vertical market focus (the three sector divisions and SID) and a single division, ASD, with cross-industry development responsibility. ASLoB also contains two additional organizations, not discussed in this bulletin, with responsibility for U.S. education and market development. In addition, it appears that systems integration will be performed by professional services personnel that report directly to field marketing, or performed by IBM's systems integration partners.

These announcements signal that IBM's Applications Solutions Line of Business is maturing and that Ned Lautenbach, its General Manager, has molded an organization that is more manageable and measurable. This new organization establishes divisions with specific focus and responsibilities that no longer overlap, with the possible exception of ASD's cross-industry mission. Market and solution development is now in the hands of the five divisions; solution implementation is the responsibility of the field organization. Execution of industry solution development and field customer solution implementation should be simpler, faster, and meet with much less internal bureaucracy.

INPUT believes that these announcements will make IBM a stronger player in the information services industry. Although one might think that IBM has dismantled its systems integration capability, what the company has really done is moved systems integration closer to IBM's field organization, where systems integration will be more responsive to customer needs. Systems integration, rather than being a unique offering, has in fact become another service integrated into IBM's solution menu.

One other IBM change worthy of note is the formation of the IBM Systems Services organization, a new unit in the National Service Division. In response to customer interest in complete systems operations services—such as the Kodak, Hibernia Bank, or Bank South contracts—NSD has brought together a number of internal IBM resources to focus on this new IBM market. This unit—headed by Bill Wilson—will have a field sales organization and will aggressively pursue opportunities to plan for, control, manage, and operate client information processing facilities. IBM is apparently serious about this market, too.

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## Network Integration—A Key Component of Systems Integration

Fostered by the growth of systems integration and driven by technology changes and business requirements, integration of corporate networks is being increasingly viewed as a corporate necessity.

From research just completed, it is clear that networks are important to business, and network integration is an integral part of information systems planning. Two years ago, 60% of users interviewed indicated that network integration was part of their information systems plans. In work just completed, this had risen to 90% and there has been a shift in emphasis.

For the past several years, emphasis has been placed on the integration of voice and data services. With the availability of cost-effective, high-capacity circuits, organizations have worked to combine voice and data on the same circuit. Though voice and data integration is continuing, integration of

local- and wide-area networks is now becoming the focus of attention.

Exactly how this integration process is going to be accomplished is open to question, however. Users acknowledge a lack of in-house expertise to deal effectively with the wide variety of technologies, but also believe that there are few vendors that have the breadth of expertise to provide integrated network solutions.

Exhibit 1

### Reasons For and Against Contracting for Network Integration

<u>For</u>	<u>Against</u>
To meet deadline	Need in-house expertise
If one-time expense	Better quality in-house
Lack of in-house skills	Vendors don't know the business
Vendor technical expertise	Vendors lack broad skills
	Too important to subcontract

More than a third of user organizations indicate that they would not contract for network integration services and, as shown in Exhibit 1, there are a number of reasons for and against contracting for services. Equally unclear is exactly where the

dividing line is between network integration and systems integration. When considering a project that would combine a number of circuits, but included no applications content, 80% of users considered this to be network integration. One hundred percent of vendors considered this to be neither network nor systems integration.

When there is application content in a project, the project is usually considered systems integration by vendors. Users are less certain. To users, when there is application content in a network integration project or a network component in a systems integration project, the project can be either systems or network integration. The exact definition appears to depend on the importance of the network to the systems being integrated.

Although clear distinctions between network and systems integration may be difficult to make, several points do become quite clear.

- Network integration is an important ingredient in systems integration projects. Thirty percent or more of a systems integration project may be for network integration.
- Network integration will become increasingly important. Seventy percent of users indicated that they will be starting network integration projects within the next five years.
- Network integration is a process, not a project. Ninety-five percent of users indicate that integrating their networks must be accomplished through a series of projects over an extended period of time.
- There is considerable resistance to contracting for network integration services. Even among those indicating that they would consider contracting (over 60%), convictions were not strong.

Exhibit 2

### Leading Network Integration Vendors

- IBM
- AT&T
- DEC
- Novell
- 3Com

- There are no clear leaders in providing network integration services. Though the companies shown in Exhibit 2 headed the list of most frequently mentioned companies, the responses were qualified, indicating that large, well-known companies are perceived to be best able to meet users' requirements.

Research indicates that network integration services will grow at a rate of at least 27% per year for the next several years. Of the total market, projected to grow from \$1.8 billion in 1989 to nearly \$6 billion in 1994, a significant portion will be derived from systems integration projects, as indicated in Exhibit 3.

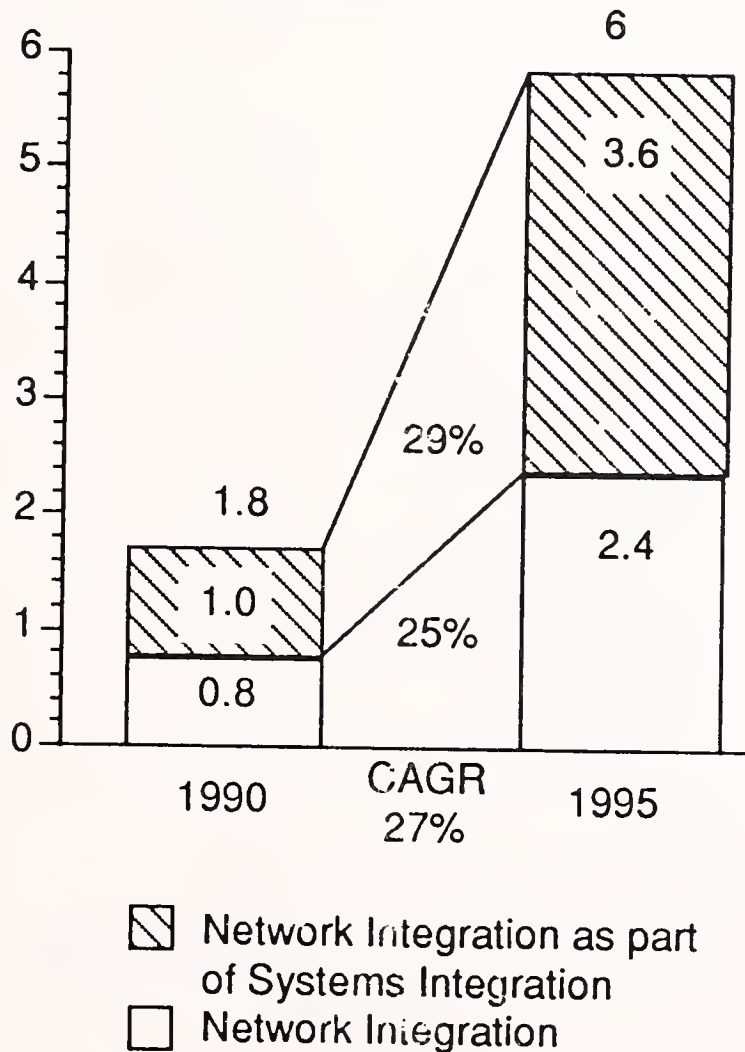
Though past emphasis has been on the integration of voice and data, the focus is shifting. Increasingly, focus will be on the integration of local- and wide-area networks and their connection to corporate systems.

INPUT believes that the growth rate for standalone projects (projects that do not have application content) could be exceeded, if several factors are successfully addressed.

- Emphasis should be placed on building integrated platforms that are strategically aligned with the organization and the information systems plan. The process of integrating data and voice into the platform will be accomplished over time.
- The end user is increasingly important in decisions to integrate networks. End users need to understand the value of integration and to be assured that integration will not adversely affect their business.
- Increased attention needs to be placed on intra- and inter-departmental information flow. Understanding an industry is not enough. Understanding information flow within an organization is important to developing an integrated platform that will meet current and future needs.
- Integrated network offerings need to include vendor provided support. Support includes training and network management, at least until organizations can develop the necessary expertise.

Exhibit 3

### Commercial Network Integration Expenditures 1990-1995



Whether provided as standalone projects or as part of systems integration projects, network integration is becoming an increasingly important consideration in most organizations.

INPUT believes that the provision of network integration services is still in the early stages and that there will be significant opportunities as the importance of integrated networks grows over the next several years. ■

This Research Bulletin is issued as part of INPUT's Systems Integration Program.\* If you have questions or comments on this bulletin, please contact your local INPUT office or Doug Wilder at INPUT, 1953 Gallows Rd., Ste. 560, Vienna, VA, 703-847-6870, Fax 703-847-6872.

\* Information for this bulletin was extracted from an upcoming INPUT report, *U.S. Network Integration Market, 1990-1995*.

# About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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## Research

## Bulletin

A Publication from INPUT's Systems Integration Program

## Electronic Imaging—Visions of Future Information Systems

### Industry Emergence

With industry spending an estimated \$120 billion per year on paper for forms and reports and creating more than one-half trillion copies or reproductions per year, technology and applications that will reduce handling and storage volume while improving support and service are welcomed.

However, though computing systems became sufficiently cost-effective for electronic imaging applications some time ago, real growth of the electronic imaging industry began with the introduction of optical recording devices. Until the introduction of optical media, the cost of storing data was excessively high relative to the value of having readily available data. Optical media have significantly altered this situation.

### Imaging Systems Overview

Electronic imaging systems are composed of a number of elements, including scanners for capturing document images, facsimile machines for transmitting the images, and page and laser printers.

The equipment that is most closely associated with the growing imaging

market is the computer-assisted retrieval (CAR) system. There are generally three major types of CAR systems.

The first and second are oriented primarily to the storage and retrieval of microforms (microfilm and microfiche). The third, based on microcomputer technology, comprises integrated micrographic and microcomputer subsystems. The computer subsystems permit extensive indexing, file manipulation, and input and output of stored information. As part of the micrographic subsystem, images may be stored on high-capacity optical disks.

### Issues and Trends

Interest in electronic imaging systems and the resultant growth has been significant. However, a number of issues, summarized in Exhibit 1, are having a dampening effect on growth of the market.

- Most users, particularly those in medium-sized and smaller organizations, believe that the cost of electronic image systems is too high for widespread use. They generally indicate that substantial improvements are needed in price performance before there can be widespread application. They do, however, expect these improvements to occur.

Exhibit 1

## Major Issues

### Electronic Imaging

- High system costs
- Media standards
- Connectivity/communications
- Legality

- As in many evolving technologies, standards are lacking, particularly for the media. Media created on one system are frequently not usable on another; software written for one type of system is different from software for other systems, even of the same vendor. However, users generally agree that necessary standards will be in place within the next couple of years.
- Connectivity and the cost of communications are also significant issues. For standalone systems to be truly functional, they must be able to connect to other types of local and remote systems. In addition, image transmission requires significantly higher transmission capacity than does standard data. Communications costs must come down and systems must be able to communicate effectively for widespread acceptance.
- Legality is also an issue, although less of an issue than it was when microfilm was first introduced. The key question is whether courts will accept a document reproduced from a digital (optical) recording as an *exact reproduction* of the original document. Although many

users express concern over this question, vendors indicate that it is not a major issue.

Research indicates that there are several trends related to the development of electronic imaging technology. Key points are summarized in Exhibit 2.

- With basic technology now available, increasing emphasis will be placed on the integration of products. Future products will provide integrated capabilities such as scanning, copying, facsimile, laser printing, and added functionality such as word processing.
- Emphasis on input occurring closer to the point of origin is expected. Scanning or facsimile devices will provide input directly from remote locations.
- There will be greater integration with other business functions such as electronic mail. Messages will be sent, incorporating an image from centralized storage to support a specific requirement.
- Storage capacity will continue to increase. Whether through jukebox-type

Exhibit 2

## Trends in

### Electronic Image Technology

- Product integration
- Input at point of origin
- Business process integration
- Higher capacity
- More mainstream

systems or increased density of media, the cost per unit of storage will continue to decline.

- Electronic imaging systems will become more integrated into the mainstream of information systems and business processes.

### Market Forecast: Systems Integration—Electronic Image

As indicated by the continued growth of the micrographics market and the trends in electronic imaging, the market for electronic imaging systems—whether to enhance existing applications or for new applications—is growing rapidly.

Based on INPUT's research of the current market and factors that could affect its growth over the next five years, INPUT estimates that the market for systems integration of electronic imaging systems is approximately \$400 million in 1990, as

shown in Exhibit 3. The market is projected to grow at an estimated 46% per year to \$2.4 billion by 1995.

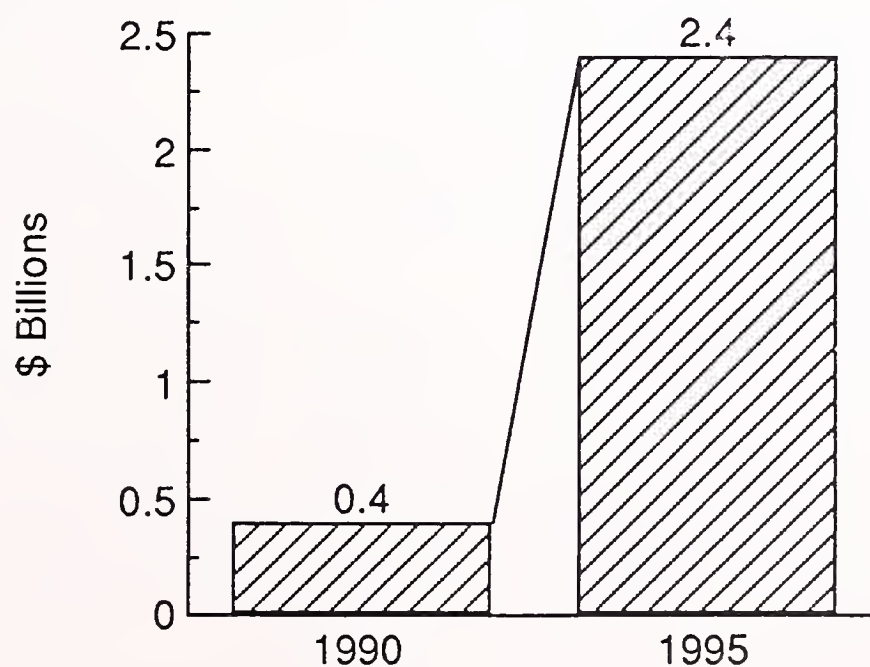
The market size and projected growth rate figures take several factors into account:

- Industry data suggests that the electronic imaging market is growing in excess of 50% per year.
- With systems integration growing at 29% per year, a growth rate of 46% for systems integration of electronic imaging systems is not unreasonable.
- Even considering this growth rate, the contribution of electronic imaging to systems integration is not large. Electronic imaging currently contributes an estimated 9% to systems integration revenues. This figure is expected to grow to an estimated 17% by 1995.

Exhibit 3

### Market Forecast, Systems Integration

#### Electronic Imaging, 1990-1995



## Driving Forces

There are a number of factors contributing to the rapid growth of the electronic imaging market. Key factors driving growth are summarized in Exhibit 4.

- Competition in business is not only driving organizations to look for more cost-effective ways of doing business, but has increased attention to providing more responsive and higher quality customer service.

Exhibit 4

### Driving Forces

- Business competition
- Decreasing system costs
- Increasing document costs
- Service quality
- Regulatory compliance

- Though most users indicate that systems are still relatively expensive, they recognize that the costs are decreasing and that, with decreases in costs, greater attention will be placed on selecting imaging systems.
- Users nearly universally recognize that costs of storing and retrieving documents are continuing to grow, as is the cost of labor.
- Electronic imaging systems will significantly enhance the quality of service provided to customers. The

ability to quickly retrieve and have original documents available to discuss specific data with a customer significantly enhances a customer's perception of a vendor as a quality service provider.

- In addition to cost and service benefits, organizations are faced with increasing numbers of regulatory requirements to substantiate decisions and actions. Government regulations and litigation possibilities place increased pressure on organizations to be able to substantiate decisions made, increasing the need to be able to produce original documents. This need is not expected to decline in the near future.

## Leading Vendors

Identifying the leading vendors in electronic imaging and the leading providers of systems integration in electronic imaging is, at best, difficult. Research produced some conflicting results.

When asked to identify the leading vendors of electronic imaging hardware, users identified vendors that do not produce imaging hardware. This suggests that the solutions are of greater importance than the producer of the hardware.

Even vendors identified vendors that do not produce imaging hardware among the leading hardware providers. Ranked in order of the number of responses from vendors, the top five vendors of image hardware were IBM, Unisys, Filenet, Recognition Equipment, and Wang.

When users were asked to identify the leading vendors of image processing systems, the top five vendors named were IBM, Filenet, Wang, Unisys, and TRW.

The leading vendors of systems integration in imaging systems provided some

interesting results. Notably, there a number of vendors among the leaders that are not generally recognized as leaders in the systems integration market. The top five vendors identified as leading vendors of imaging systems integration are shown in Exhibit 5.

- There are several issues that remain to be resolved in order for electronic imaging to become a mainstream focus of many organizations. There need to be more standards for the use of media. There needs to be greater connectivity; and questions of legality need to be resolved.

Exhibit 5

### Leading Vendors, Systems Integration Imaging Systems

- |                         |        |
|-------------------------|--------|
| • Andersen Consulting   | • IBM  |
| • TRW                   | • AMS  |
| • Integrated Automation | • Wang |
|                         | • EDS  |

Of particular note is that none of the vendors provide hardware, and that Andersen Consulting, identified almost twice as frequently as other integrators, is frequently considered to be as much a business consultant as a systems consultant.

### Recommendations

Conclusions and recommendations resulting from this research are summarized briefly as follows:

- Imaging is not new, but the market for electronic imaging and integration with existing applications is just beginning to become a major consideration.
- Users consider improved service to the customer to be the primary motivation behind electronic imaging. Users believe that improving customer service can provide competitive benefit.

There are several areas that vendors need to address, to be successful in the electronic imaging market. The primary recommendations are summarized in Exhibit 6.

- *Develop Industry Knowledge* - Vendors of electronic imaging systems and services need to develop an understanding of the specific industry in which the imaging system is to be applied. Users indicate that an understanding of the industry's business processes is necessary to accurately assess needs and requirements.
- *Build End-User Relationships* - Users indicate that costs for new or enhanced imaging systems are frequently included in end-user department budgets, not in organizations' information systems budgets. Strong end-user relationships are therefore necessary to ensure an understanding of needs and

## Exhibit 6

**Recommendations**

- Develop industry knowledge
- Build end-user relationships
- Provide more education
- Understand document management process
- Establish strong alliances
- Develop industry standards
- Address legal issues

requirements and to be able to influence future spending.

- *Provide More Education* - Education of end-user management is necessary to ensure an understanding of the benefits of electronic imaging technology. This is particularly true since most electronic imaging technology is being applied to processes that already exist. Considering the currently high costs, an understanding of the added value is necessary.
- *Understand Document Management Process* - Vendors entering the field of electronic imaging, particularly those that are traditionally oriented to information systems, need to understand

the document management process. Although many systems design skills are transferable to records management, there are a number of different considerations and skill sets may need to be modified or enhanced.

- *Establish Strong Alliances* - Since document management systems have different characteristics than information systems, few vendors have in-depth knowledge of a wide variety of industries, and electronic imaging systems can be composed of a variety of components, vendors need to build strong supplier and support relationships to ensure availability of equipment and expertise.
- *Develop Industry Standards* - Industry standards for recording formats and processes are necessary for electronic imaging systems to be fully accepted.
- *Address Legal Issues* - Though vendors generally do not view the legality of electronic images as a problem, the majority of users indicate that legality is an issue that needs to be addressed and resolved. Vendors should be at the forefront of ensuring that legal issues are resolved.

The electronic imaging industry is young and dynamic. As system costs come down and the value of electronic imaging becomes more recognized, an increasing number of organizations will look to electronic imaging as a means of addressing a wide variety of concerns.

Vendors that are able to demonstrate imaging and organizational expertise should be able to identify significant opportunities for integrating electronic imaging into the mainstream of business.

This Research Bulletin is issued as part of INPUT's Systems Integration Program. If you have questions or comments on this bulletin, please contact your local INPUT organization or Doug Wilder at INPUT Inc., 1953 Gallows Rd., Suite 560, Vienna, VA, 22182. Phone: 703-847-6870, Fax: 703-847-6872.

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### LAN Development and Management

LANs will become an indispensable corporate resource within the next five years. So says the trade literature.

For this to be true, there will need to be considerably greater interconnection of LANs. Why has there not been more progress in connecting the growing number of disparate LANs? Although there is great interest in enterprisewide connectivity, INPUT's research indicates that enterprisewide LAN networking is progressing at a very slow pace. What's the problem, or is there one?

Trade and product literature suggests that by adding a bridge here and a router there, a little software, and cables connecting PCs and workstations, users will be able to talk to multiple mainframes to run multiple applications while transferring information throughout the organization quickly and easily. Promotion aside, is this an accurate perspective or is enterprisewide LAN connectivity a broader consideration?

In two recently completed reports, INPUT conducted research into the trends and markets for network integration and network operations management. Though these reports focused on the broader concept of networks, a common theme developed. When considering network integration or management, local-area networks have become a major concern in many organizations.

Using the research for these reports as a base, additional research has been conducted to assess the reasons why LAN networking has not progressed at a faster pace. Are the reasons primarily technical or are they more related to management questions and issues?

Starting with some background on the evolution of LANs, the bulletin provides a summary of what LANs are and how LAN and data networks differ. The bulletin discusses key problems that are retarding progress to interconnected LANs and provides a number of recommendations for vendors that want to become leaders in a market segment in which there are no real leaders today.

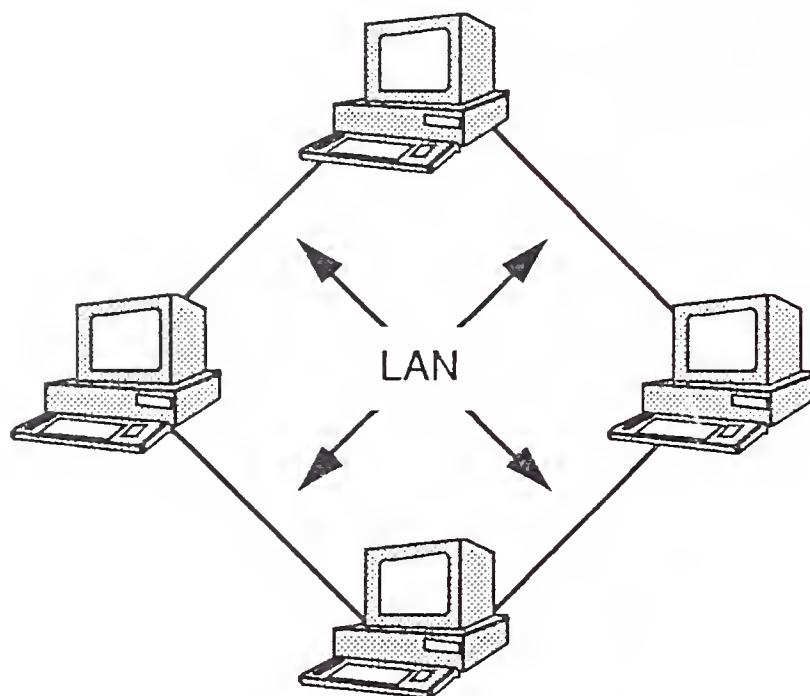
#### Background

When first introduced, local-area networks were intended to provide high-speed connections between similar types of PCs located closely together (Exhibit 1). With the connectivity, users were able to share common resources such as printers and large memories.

Early networks such as Ethernet were intended to meet office automation needs and there was little need for the local networks to talk to each other. Subsequently, PCs added modems to access on-line data bases through conventional common carrier lines. They

Exhibit 1

### Early Local-Area Network



The total number of devices was expanded, and LANs that can transmit at 10Mbps (Megabytes per second) today will be able to transmit at 100Mbps or even 300-500Mbps within a few years.

Enhancements and continuing demand for greater connectivity fostered new types of area networks or, at least, new words to describe them. The terms MAN and WAN (metropolitan- and wide-area network) were seen more often. Generally, the new terms were used to describe the geographic area covered. From a technical standpoint, there are many differences. From a management standpoint, there are few.

### What is a LAN?

then moved to E-mail. Users then sought ways of accessing central files, then each other, in real-time.

Information systems managers did not have a great deal of interest in the early LANs. From their perspective, a LAN was a local (department) concern. Since information systems frequently did not have any involvement in the acquisition of the PCs or the LAN, they were not concerned about support. But this situation has changed.

Users that were initially interested in sharing local resources are now interested in sharing corporate resources and communicating with other departments that have acquired their own (different) LANs. Decisions made independently are now being viewed as a corporate responsibility. LANs themselves have also changed.

Early LANs had limited capacity. They supported a few terminals and the terminals could not be far from each other.

To understand the reasons that there has not been greater progress in integrating LANs, it is necessary to understand the current state of LAN technology and some of the key differences between data and LAN networks. The following provides a brief synopsis of the current state of LAN technology. It is not intended to be a LAN tutorial, but an indication of the complexities that exist.

In today's market there are three types of media for connecting LANs and three different topologies. Each has different cost, operational, and performance considerations.

LANs can be connected through twisted pair (copper wire), coaxial cable, or fiber optic cable.

- Twisted pair is the least expensive and most readily available. Twisted pair copper cable is already installed in most buildings. Twisted pair is best for short distances, for connecting a small number of PCs. However, twisted pair is limited to several hundred feet and is

susceptible to electrical interference. Some protection can be provided through shielding and use of repeaters, but this increases cost.

- Coaxial cable comes in different forms, each for a different purpose.
  - Baseband provides connections up to several thousand feet. However, it transmits only digital data. Baseband is suitable for a small data processing or office automation environment where only data transmission is required. Baseband coaxial cable may need to be installed in hard conduit to meet fire regulations, increasing installation cost.
  - Broadband coaxial cable can provide connections up to several miles. However, transmission is only analog. Broadband coaxial cable is suitable for large configurations where the complexity justifies the added installation and maintenance costs. Broadband can support voice and video as well as data.
- Fiber optic cable offers the greatest opportunities for the future. It will support digital and analog transmission. It is virtually immune to interference from tapping and can transmit over great distances. However, fiber is expensive.

In addition to the media to be used, information systems managers must make decisions about the type of topology that will best meet current and future needs. There are three types of topology.

- On a linear bus, all stations are arranged along a single path. With a linear bus, all transmissions are broadcast and any station can receive transmissions from any other station. All broadband and many baseband technologies use the linear bus topology.

- The ring topology is similar to the linear bus, but stations are arranged in a ring. There is one master control for the ring. All stations can receive transmissions from any other station on the ring. As with the linear bus, transmission is of the broadcast type.
- Star technology utilizes a central node to control transmission. All transmission is point-to-point, between the central node and each station. The central node determines which station is to receive each transmission.

There are several alternatives for connecting LANs. Repeaters, bridges, routers, and gateways each provide a unique function.

- A repeater gives the ability to expand the size of a single LAN by amplifying the signal periodically. Repeaters only work with similar protocols and are limited in the distance that they cover. In addition, the repeater reinforces any electrical interference (noise) that may have been introduced into a line.
- Bridges provide an ability to connect similar LAN architectures across different media—i.e., LANs running on twisted pair across T1, coaxial cable, or ISDN circuits. They are protocol-independent and provide no data conversion.
- Routers provide a means to connect complex networks. They have greater intelligence, selecting the cheapest and fastest route for a transmission. However, because they are more intelligent they are slower than bridges. Routers can be programmed to recognize certain criteria, but work with only one protocol.
- Gateways are intended for wide-area connections. They perform protocol conversion, permitting the connection of networks of different types. However,

they are the most expensive and, because of the increased decision processing, reduce network speed.

From a technological standpoint, there are three major factors affecting the performance of LAN internetworking.

- The first is the speed across the local- to wide-area link. The need to perform protocol translation and control routing will reduce speed. Control will be increased at the expense of speed.
- The second is the speed of the wide-area (low-speed) network. The speed of any network is determined by the speed of the slowest link.
- The third is the degree of protocol conversion. The greater the number of conversions that must be made, the slower the network will run.

Although there are numerous products available, universal LAN connectivity is difficult to achieve, at least at a reasonable cost. However, INPUT believes that there is currently more technology available than most users are able to effectively utilize. And the amount of technology is increasing every day.

In addition to the complexity of LAN technology itself, there are a number of significant differences between data and LAN networks that add to the complexity of design and integration.

Understanding the differences is important. Most information systems and telecommunications managers have extensive experience in voice and data network design. They have an increasing number of tools that provide analysis of performance and design alternatives.

The same managers have little experience in the design of local-area networks and few tools to help them monitor or design them. With a growing need to connect local-area networks to wide-area network services, they have significant concerns about the effect that LANs could have on data networks. There are several reasons related to the characteristics of local-area and data networks.

## Data Networks

Data networks have numerous characteristics. There are, however, several characteristics that differentiate them from local-area networks. Several key differences in characteristics between data and local-area networks are summarized in Exhibit 2 and discussed below. Key data network characteristics include the following:

Exhibit 2

### Data Network/LAN Comparison

Characteristic	Data Network	LAN
Data Type	Data	Data/information
Access	Controlled	Uncontrolled
Volume	Predictable	Unknown/unpredictable
Changes	Controlled	Uncontrolled
Speed	2.4Kbps/9.6Kbps	10-100Mbps
Security	Device/user-specific	Networkwide

- **Data Type** - Data networks transmit data. Although larger, general purpose networks can permit certain amounts of text, the amount of text is small and transmissions are generally of known composition. Transactions generally have predefined fields with fixed, maximum numbers of characters.
- **Access** - Access to a data network is centrally controlled. Designers know, in advance, the location and type of access devices. While any device may or may not be active at any given time, the highest level of activity can be predicted. Generally, changes cannot be made without prior knowledge.
- **Volume** - The volume of a data network is predictable. With experience and the use of design and management tools, volume by hour, day or month can be predicted. Networks can be designed to accommodate the highest predicted volume.
- **Changes** - Changes to data networks are controlled. Because of software and hardware requirements, designers and managers know what changes are made, when the changes are made, and the effect of the changes.
- **Speed** - Compared to local-area networks, data networks operate at low speed. Data transmitted between computers on any given circuit is typically at speeds ranging from 2.4Kbps to 9.6Kbps. Some networks may transmit at speeds as high as 5Mbps. Multiplexers permit the combining of transmissions onto higher-speed circuits. Fiber and T1 circuits permit the combining of numerous low-speed circuits. But in each case, a computer transmits or receives the data at the much lower speeds.

It is important to note that data network speed is not a technological constraint. Circuits can transmit at higher speed

and computers can accommodate considerably higher data rates. The speed of data networks is constrained by their need to interact with humans providing, typically, small amounts of data at a time. Higher circuit speeds would not be cost-effective.

- **Security** - Security for data networks is generally specific to a network. Networks that require high security are separated from general application networks. The needed degree of security is applied in each case.

## Local-Area Networks

As with data networks, local-area networks have numerous specific traits. There are, however, several that are directly related to the difficulties in developing integrated network solutions. Several key characteristics are shown in Exhibit 2. Note that technology is not among the characteristics. After years of development, technology is available to meet most network integration requirements.

- **Data Type** - A local-area network has no specifically definable type of data. Most transmit a combination of data and information. Unlike a data network, there is no definable composition to the transmissions. Users accessing a host system one minute may be sending a flood of administrative messages the next. Data to update a data base may be followed by transmission of an image or a large spreadsheet. Each has different data characteristics and can have significantly different performance characteristics.
- **Access** - From a management viewpoint, access to resources from a local-area network is generally uncontrolled. Selective restriction is, at best, difficult. Once networks are integrated, users generally have access to all other users and systems on the network.

- **Volume** - Unlike a data network, the volume of data/information on a local-area network is both unknown and unpredictable. Once implemented, network monitoring will result in profiles that can be applied to future development. But in the short term, there is little data that can be used to determine in advance the average usage by hour or day.

Of greater importance, when considering local-area network volume, is the dynamics of information flow within an organization. Unlike data networks, there is little data to suggest when managers and staff send messages, what data is needed when, or the characteristics of data transmitted and received.

Data networks are designed to meet peak-hour demands, with sufficient excess capacity to accommodate growth. Designing a wide-area network that would accommodate peak-hour LAN capacity could be prohibitively costly.

- **Changes** - Changes to software on a local-area network are difficult to control. Software run on PCs and workstations is acquired by individuals to meet individual need. With the exception of standards for word processors or spreadsheets, users or department have varying needs for software products. Changes made to the software at one PC on a network can have a significant impact on the performance of a network.
- **Speed** - The speed at which local-area networks transmit is dramatically different than that of traditional data networks. Systems transmitting at 100Mbps are more closely associated with channels on a computer system than with traditional telecommunications networks. In addition, there are few tools available to provide comprehensive analysis of LAN transmission characteristics.

- **Security** - Unless multiple local-area networks are established, security is a significant issue. Most users will not adhere to the requirements of a high-security network.

## Information Requirement Considerations

Compounding the technological differences between data networks and LANs are significant differences in data and information requirements between organizations and within an organization. The differences in data and information needs have a major effect on design and development considerations. Exhibit 3 identifies a number of the major considerations.

Exhibit 3

### Information Requirements Considerations

- Staff requirements
- Executive requirements
- Information dissemination
- Information/data security

- **Staff requirements** - In most organizations, department staff require data. Their primary function is to receive, analyze, and synthesize data into meaningful information. Depending on organizational requirements and the availability of data, department staff will have need to access a number of files, data bases, or individuals to obtain the data. There can be extensive interaction between individuals working with the same data, requiring multiple transmissions of high volumes of data.

Within certain bounds, data needs can be anticipated. Sales, marketing, and accounting staff perform extensive analysis at the end of defined periods (week, month, quarter, etc.). However, research and planning staff continually need a wide variety of data. Their needs are irregular and generally not predictable.

- **Executive requirements** - Management receives and disseminates information. Their needs are irregular and unpredictable. Changes in events may cause immediate, comprehensive data analysis by staff. Whether received from their staff or created internally, information distribution must frequently be immediate and widespread. Frequently, predetermined priorities must be altered to accommodate executive information needs.
- **Information dissemination** - Dissemination of data and information may be narrow (one-to-one) or wide (broadcast). It may be internal or external. Information to be distributed may be highly restricted or intended for general release. Release of confidential data can be highly damaging. The unpredictability results in concern about security, priority, and potential impact on other systems.
- **Information/data security** - Much information and data in an organization is highly confidential. Extensive linking of LANs imposes significantly increased security considerations. How will security be controlled? How will information flow from a secure to an unsecured network? Is there a need for multiple LANs, each with a different level of security?

Understanding the flow of information within an organizations is critical to the success of a local-area network. This is a business, not a technical, requirement.

Designing a network to provide unrestricted access or flow of information can subject the network to excessive volume and provide significant opportunity for release of confidential data. This type of network would be exceptionally costly and highly vulnerable. Designing a network with high restrictions and control reduces many of the benefits of a local-area network.

## So What's the Problem?

From the preceding synopsis, it is readily apparent that managers are faced with a wide variety of choices and issues. However, the fundamental problem of why there is not more internetworking is simpler than the technological complexity indicates.

Simply stated, users don't know what they want. And as Alice (in Wonderland) learned: if you don't know where you want to go, any road will get you there. The fact of the matter is that most users do not know where they want to go.

- Do they want a network to transmit data and only data directly between PCs and workstations and only PCs and workstations?
- Do they want to connect all user terminal devices (PCs, workstations, terminals, etc.) to all corporate computing resources, including mainframes and other terminals, irrespective of location?
- Do they want to provide a common electronic highway for the transmission of all corporate media (voice, text, visual)?
- Are all users permitted to have access to all corporate information or only to selected subsets? If subsets, which subsets will be accessible by which individuals? And who controls access

permission—the department, information systems, or must senior management make the decisions?

- What about software standards? Can an organization set (and enforce) standards that limit users to a choice of two word processing packages, one spreadsheet, and one desktop publishing package? Will one CAD (computer-aided design) package meet the needs of all design engineers?
- Who (or what application) has priority on a network? Will the broadcast of a lengthy (senior) management document have priority over the data being collected for a critical daily application?

These are management questions and issues and the list could be quite long. They have little to do with technology. But the answers govern the architecture that will best meet the needs of an organization.

From research, INPUT believes that the reasons that the integration of LANs has not progressed rapidly are predominantly management issues. Additional, improved products are needed. There is also a great need for network management and analysis tools. But high quality products (which many are) and an ability to manage the network(s) effectively are of little value if they do not support the needs of organizations.

For an enterprisewide local- or wide-area network to be successful, strategic design decisions must be made first. These decisions need to be followed by architectural design decisions. Only then are technological considerations important.

## Network Design Considerations

There are a number of considerations for systems and network integrators. INPUT believes that successful vendors will be those that recognize the considerations and structure marketing plans accordingly. Major considerations are summarized in Exhibit 4.

Exhibit 4

### Integrated LAN Design Considerations

- Integrated networks important
- Organizational knowledge necessary
- Knowledgeable staff limited
- Multivendor expertise necessary
- Integration process
- Total integration limited
- Few network integrators
- Support essential

- **Integrated networks important** - Whether to realize cost savings or to provide competitive advantage, integration of networks is important to all users. Almost universally and certainly among large users, there is recognition that networks must be integrated if the benefits of systems integration are to be realized.
- **Organizational knowledge necessary** - The success of many integrated local-area networks will depend, to a great extent, on the network's ability to integrate with the information and data needs of the

organization. To successfully address these needs, vendors must be knowledgeable in the data and information requirements of the organization.

Users generally note a lack of knowledge on the part of vendors about how their organization operates. Though a vendor may have broad industry knowledge, a client-specific understanding of how information flows within that organization is necessary to successfully plan for integrated LANs.

- **Knowledgeable staff limited** - In many organizations, there is a lack of staff with the skills necessary to successfully integrate the diversity of local-area networks. The staff has expertise in voice and data networks, but few organizations have the breadth of expertise to address the technical aspects of the wide variety of LANs currently implemented.

The lack of expertise is important to system and network integrators. Users are increasingly interested in vendors that can provide a skilled staff to integrate their local-area networks.

- **Multivendor expertise needed** - Single product focus or lack of technical expertise in a wide variety of products is a key reason that there are no dominant leaders in providing network integration services.

Users believe that hardware vendors are too oriented to their own hardware. In addition, users do not believe that expertise in a particular piece of hardware translates to expertise in local-area network integration. Carriers are believed to be too oriented to carrier-based (voice and data) systems.

Telecommunications managers do not believe that voice and data network design skills translate to local-area network design expertise. Users have greater confidence in local-area network providers, but recognize that they have limited skills in voice and data network design.

- **Integration process** - Users believe that system integrators want to sell major projects to integrate all networks. They believe that this is not possible. Users believe that networks must be integrated over time, from a common architecture. Though a single project may result in an integrated architecture, it will not result in complete integration of an organization's networks.
- **Total integration limited** - Portions of users' networks will not fit into an integrated approach. Frequently, highly critical networks or networks with unique operating requirements may not fit into an integrated network structure. Total network integration is therefore not possible.
- **Few network integrators** - Users indicate that there are no real leaders in network integration. Although hardware vendors lead the list of those mentioned, many users either did not know or have little conviction regarding primary vendors. Many who do identify vendors qualify their responses, indicating that their opinions are not strong.
- **Support essential** - Operational support of an integrated network is described as an essential requirement. Products and services to manage the network are considered to be a necessity. Support includes both network management and maintenance.

## Recommendations

INPUT believes that vendors that can respond successfully to the challenges of this market segment have an opportunity to succeed in a market where there are no dominant leaders today. The key recommendations, summarized in Exhibit 5, are discussed below.

Exhibit 5

### Recommendations

- Understand end-user needs
- Understand information flow
- Architecture strategy
- Provide network support

- **Understand end-user needs** - The needs of the end user are increasingly important. Understanding end user needs and requirements to share data and information will make selling

integration services easier. Users have an increasing voice in systems and network expenditures. Users are frequently reluctant to approve expenditures unless they fully understand the direct benefits.

- **Understand information flow** - Users indicate that to successfully integrate local-area and office networks, a vendor needs to understand how information flows within a particular office and within the total organization.
- **Architecture strategy** - Focus on developing a network architecture that users can use as a base for integrating telecommunications services. Assistance in developing and implementing a standardized architecture that will meet current and future needs will be better accepted than trying to provide totally integrated networks.
- **Provide network support** - Recognizing that they lack expertise for the wide variety of products available, users need to ensure that the integrated network is fully supported. Support means both network management and maintenance of network equipment.

This Research Bulletin is issued as part of INPUT's Systems Integration Program. If you have questions or comments on this or other bulletins in this series, please contact your local INPUT office or Doug Wilder, at INPUT Inc., 1953 Gallows Rd., Suite 560, Vienna, VA, 22182.  
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# INPUT<sup>®</sup>

## Research Bulletin

A Publication from INPUT's Systems Integration Program

## Systems Integration Market Forecast

This research bulletin is being issued as a preview of INPUT's report, *Systems Integration Market Analysis, 1990-1995*. It provides an overview and summary of the findings in the report.

### Market Overview

In 1990, systems integration continued to grow and was not only a significant source of information services revenue, but an important distribution channel for information products. While much industry attention was focused on the systems operations outsourcing market during 1990, the systems integration market continued to thrive and be an important source of opportunities and revenue for information service vendors.

When the commercial systems integration market blossomed in the mid-1980s and commercial SI organizations were patterned after successful federal SI vendors, there was a belief that the market would contain a significant number of mega-contract opportunities. Though there are some commercial mega-contracts available, the majority are smaller and more geographically dispersed than the federal market. Because these contracts are smaller, they do not get the same level of publicity that the larger federal contracts do, but the commercial market continues to grow.

During 1990, a number of SI vendors showed aggressive growth in their SI businesses. For example, Andersen Consulting's 1990 fiscal year results, which are predominantly SI, showed revenue growth in excess of 30%. Though other vendors have not yet reported their results, INPUT is confident, based on quarter-to-quarter comparisons, that most of the industry leaders will also experience significant SI growth.

Not all companies were happy with their successes in the SI market. During 1990 Boeing Computer Systems decided to exit the commercial market and focus its resources on the federal market and on supporting its successful aircraft business. Oracle, disappointed with the degree of success of its commercial SI organization, made changes in its management team.

To adjust their organizations to the smaller size and geographical dispersion of commercial systems integration opportunities, several companies adjusted their organizations in 1990. AT&T, IBM and Unisys reorganized their systems integration activities to place their resources closer to the clients' premises. In each case, standalone SI divisions or departments were broken up and the capabilities were distributed among the field organizations.

Overall, the systems integration market remains healthy; however, in the remainder of this research bulletin, INPUT will forecast slowing market growth resulting from the U.S. economic downturn.

Major Buyer Issues

U.S. businesses, more than ever, are feeling the pressure of competition from both domestic and foreign companies. This pressure is forcing organizations to look closely at their core business to identify features that differentiate their products and services from the competition. In many cases, the application of technology can make the difference in offering a superior service faster, or reducing the length of product development cycles. These new solutions are becoming increasingly complex as they change traditional business processes and serve new organizational structures that often are required to operate around the clock and throughout the world. Exhibit 1 identifies the major buyer issues in 1990.

Exhibit 1

Major Buyer Issues—1990

- Competitive demands
- Core business focus
- Users becoming buyers
- Increasingly complex solutions
- New technology application
- Unavailable skills

As INPUT studies information systems budgets, it has become apparent that an increasing amount of information systems expenditures is no longer controlled by internal information systems organizations. This is because user organizations are, in many cases, becoming the buyers of solutions and control the budgets for them. Many of the solutions that users seek include new technologies such as artificial intelligence, image processing, and a variety of advanced telecommunications alternatives such as LANs, WANs, and MANs. Systems integrators with good track records provide an attractive alternative to internal information systems organizations that often lack adequate resources and skills to meet new user requirements. Some internal organizations also lack the application knowledge and experience in new technologies that is required in the solutions being sought.

Market Forecast, 1990-1995

During 1990, the domestic economy slowed and domestic industry spent \$534 billion for plants and equipment, an increase of 5.2% over 1989. This was less than one-half of the 1988 to 1989 increase of 11.4%. An increase of just 2.4%, to \$546 billion, is projected for 1991. While industry will continue to invest in new capital equipment, INPUT believes that the recession will slow down the number of new commercial SI projects that are begun in 1991.

Action by industry to solve the problems it faced increased expenditures for commercial systems integration to \$3.9 billion in 1990, despite predictions of a lower GNP. INPUT forecasts that a still cautious industry will selectively invest in new and expanded information systems in the near term, and that expenditures for vendor-provided SI solutions will reach \$10.8 billion in 1995. This represents a CAGR of 23%, down from the 29% predicted last year. Narrowing margins

Exhibit 2

### Systems Integration Market Forecast Commercial versus Federal

	1990	1995	CAGR (Percent)
Commercial	3.9	10.8	23
Federal	2.5	4.6	13

and reluctance to invest in new information systems solutions, and much less use of outside vendors to implement them, are expected to continue to hinder demand for systems integration. Exhibit 2 provides the forecast for the commercial and federal markets.

The growth in demand is focused in a few vertical industries, and is not uniformly spread across industries facing increasing competition.

The federal market has not grown as much as predicted earlier. The expected increase in large system authorizations has been delayed by the Gramm-Rudman-Hollings Act and defense cuts to reduce the national budget deficit. Expenditures for 1990 are expected to reach \$2.5 billion, and are expected to increase to \$4.6 billion in 1995. This

represents a CAGR of 13%, down from 18% forecasted just a year ago.

### Forecast by Industry Sector

Discrete manufacturing was the largest commercial market for systems integration in 1990, as shown in Exhibit 3, and will continue to be throughout the forecasted period. The

key business functions continue to be streamlining and integrating the entire product development, manufacturing and

Exhibit 3

### Forecast by Industry Sector

Sector	(\$ Billions)		CAGR (Percent)
	1990	1995	
Discrete Manufacturing	.98	2.93	25
State and Local Government	.58	1.64	23
Utilities	.47	.92	15
Banking and Finance	.37	1.28	28
Retail Distribution	.24	.83	28
Insurance	.20	.62	25
Telecommunications	.18	.48	21
Medical	.23	.43	13
Processing Manufacturing	.16	.41	21
Transportation	.16	.37	19
Wholesale Distribution	.14	.28	15
Personal/Consumer Services	.08	.23	24
Education	.08	.19	18
Business Services	.05	.17	28
Miscellaneous	.01	.03	39

distribution processes. This is a massive undertaking for most companies, but is essential to retain competitiveness and market share.

State and local governments will be the second largest SI market over the forecast period. These organizations have many of the same problems of the federal government, and provide integrators with an opportunity to replicate a solution over a sizeable number of governments.

The third largest CSI market is utilities. This industry has a special set of applications, generation plant and network management systems that provide opportunities for a number of industry-focused vendors. Although its growth rate is relatively slow (a CAGR of 15%), it will continue to provide opportunities over the five-year period, but will slip from third to fourth in size by 1995.

The fourth largest CSI market in 1990 is banking and finance, and it will be the third largest in 1995. This sector will continue to recover from the impacts of deregulation, the thrift crisis, and lower volumes in the brokerage community. There will still be a need for integration of a number of individual services into systems that include all of a customer's activities with the institution. However, the growth of these opportunities (at a CAGR of 28%) will be slower than forecasted in 1989 (a CAGR of 33%).

Discussions of all 16 vertical industries are included in the 1990 SI market analysis that clients will be receiving shortly.

## Vendor Goals and Objectives

Most of the vendor goals and objectives identified in Exhibit 4 are market driven. Systems integration is a very high-level distribution channel for the complete range

of information and telecommunications products and services. It provides or limits product access to the largest users in U.S. industry. Vendors who do not have access to this channel fear they will lose market share and control of their existing customers.

Exhibit 4

### Vendor Goals and Objectives

- Long-term account control
- Decentralized services
- Full-service image and offerings
- Industry knowledge and skills
- Market coverage
- Proprietary products and methodologies
- Market participation

The information industry has evolved from product to services orientation and from an environment where the customer was totally responsible for implementation to one where vendors are assuming these responsibilities. Customers are seeking one-stop shopping and vendors are striving to add additional products and services so as to become full-service providers. User organizations are clearly looking outside for a single point of responsibility. Product and service providers are adding front-end consulting and back-end operations. Some are seeking to achieve these goals by building from within or by making acquisitions, and others look to alliances to provide this full-service image.

In 1990 there was a recognition that these services needed to be located physically close to the customer. So a number of vendors abandoned centralized SI organizations and moved SI resources into their field organizations.

Vendors recognize the importance of understanding the client's business, particularly in an environment where long-term relationships are important. To achieve this goal, vendors are making significant investments in industry architectures and solutions, hiring industry experts and establishing alliances with consulting firms or professional services firms that already have industry expertise.

The larger vendors that already have product industry coverage have established goals to improve their SI vertical industry coverage, to protect their existing customer relationships. Smaller vendors are honing niche skills and gaining market coverage through alliances with the larger vendors who seek vertical industry skills.

Vendors are building and marketing proprietary products and methodologies. Solid methodologies for requirements analysis, systems design, program management and integration and implementation improve the odds for program success and reduce the risk of catastrophic failure. They also build a record of success that can be used for reference selling. Framework products continue to be developed that can be tailored to satisfy a client's specific business needs.

Finally, a growing number of secondary vendors are seeking participation in the market. Many have products that were previously sold as standalone systems, but are now candidates for integration into larger solutions. These products include basic computing equipment as well as robots, warehouse storage and retrieval systems, on-board computers, and a variety of communications products. Other vendors seeking SI participation include companies that have developed solutions internally and want to market these skills and products to others in their industry.

## Summary

Although the systems integration market forecast has slowed, it is still the fastest growing market in the information services industry. The market continues to be an important channel for the distribution of information products and services, and also creates a new set of challenges and opportunities for the vendors who participate in it. As in the systems operations market, the SI market demands that vendors assume more risks but creates new levels of business opportunity.

Clients and prospects are demonstrating an increased willingness to transfer the responsibility for management of development or operations to vendors. The real question is, are vendors prepared to meet the challenge? The rewards for the successful vendors will be great. In return for quality management, vendors will be rewarded with the opportunity to influence and often control the clients' information systems spending plans and, in some cases, become partners participating in clients' business successes.

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This Research Bulletin is issued as part of INPUT's Systems Integration Program for the information services industry. If you have questions or comments on this bulletin, please call your local INPUT organization or Doug Wilder at INPUT, 1953 Gallows Road, Suite 560, Vienna, VA 22182, Telephone (703) 847-6870, Fax (703) 847-6872.

# About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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# INPUT<sup>®</sup>

## Research Bulletin

A Publication from INPUT's Systems Integration Program

## Groupe Bull Systems Integration Strategy

Groupe Bull has strong systems integration credentials in Europe and is expanding its U.S. participation. It is committed to providing successful solutions for its systems integration clients even if the majority of the product required is non-Bull. Other SI vendors may want to know more about Groupe Bull's strategy as it sets out to expand its systems integration business. As will be discussed later in this bulletin, Groupe Bull has a strategic focus on developing and maintaining quality partnerships with other SI vendors that offer opportunities in the U.S. and in Europe.

Jacques Weber, Executive Vice President of Groupe Bull's Systems Integration Group, recently reviewed this renewed worldwide emphasis on systems integration with Peter Cunningham, President of INPUT. Both parties agreed that INPUT's Systems Integration Program clients would be interested in hearing more about them.

Groupe Bull's renewed emphasis on systems integration is a result of recognition of its clients' needs for services and solutions. Its large customers have expressed a growing need for systems integration services as they see equipment

architectures evolving in two related but distinctly different directions.

First, Groupe Bull's clients believe that open systems architecture is being reaffirmed as vendors join together to find a common operating environment strategy. Users are planning new systems applications that are transportable across platforms and that will reduce their corporate investment in software development and maintenance costs.

Second, distributed architecture strategies are being implemented by corporations to capitalize on the cost effectiveness of minicomputers or microcomputers for departmental applications while still retaining the information depository capabilities of large mainframes.

### Market Evolution

The pattern that Groupe Bull's clients believe is emerging is that no one vendor can provide the entire solution—hence the need for a systems integrator. Groupe Bull is positioning itself to participate in that market as it evolves. Exhibit 1 presents Jacques Weber's view of systems integration market drivers.

Exhibit 1

### Systems Integration Market Drivers

- Need for interoperability
- Complex customer environments
- Complex procurement decisions
- Sharing of project risks
- Focus on mission-critical systems

The need for integration services increases as the need for interoperability increases. The systems integrator must know how to combine different platforms with multiple operating systems to deliver a seamless solution to the user. It must adapt to a customer environment that becomes more complex as businesses become more interdependent and operate around the world and around the clock.

The procurement process will become increasingly complex in this environment. Along with this complexity will be a higher degree of risk. The client's MIS staff needs to focus more and more on mission-critical systems, systems whose successful

implementation will, at the least, improve the firm's competitiveness. Often, these systems will even alter the way the company does business. In such an environment, clients are asking the systems integrator to share in the project risk.

### Groupe Bull's Integration Strengths

Jacques Weber outlined the strengths that Groupe Bull brings to the systems integration marketplace. These are summarized in Exhibit 2. Groupe Bull is an organization of more than 2,500 systems integration professionals. The technological skills they bring to bear on client problems include expertise in such "hot" new technologies as image processing and secure networks.

The entire R&D resources of Groupe Bull's worldwide laboratory organization have been put at the disposal of its systems integration professionals.

Groupe Bull has already penetrated selective niches in specific market sectors in Europe. It plans to build on its expertise to expand its penetration even further. Jacques Weber gave examples of Groupe Bull's experience. He pointed out that Groupe Bull has 25% of the police command and control systems in the U.K., Italy, Spain, and France. It also has 30% of the market share in the retail and distribution industry in the Netherlands. As Exhibit 3 illustrates, the company also has a dominant position with European federal revenue and customs agencies.

The market penetration illustrated in Exhibit 3 is particularly significant when it is noted that the European Economic Community is developing recommendations for European companies to set up pan-EEC applications. Groupe Bull is well positioned as an integrator of choice for this opportunity, if it does indeed come to pass.

Exhibit 2

### Groupe Bull Integration Strengths

- 2,500 SI professionals
- New technology focus
  - Secure networks
  - Image processing
- Worldwide R&D lab network
- Base of European SI projects

Exhibit 3

**Groupe Bull's Market Penetration**

Market Niche	Countries
Police command/control	U.K., France, Italy, Spain
Revenue systems	U.K., Poland, France, Ireland
Customs systems	U.K., Belgium, Denmark, Italy, France
Retail distribution	The Netherlands

**Groupe Bull's Strategic Orientation**

Groupe Bull is well positioned to be a worldwide systems integrator serving the needs of its global clients. The recent acquisition of Honeywell Federal Systems Inc. enhances that capability still further. The emphasis on systems integration is in line with the overall company strategy of expanding its role from that of an equipment vendor to that of a full-service provider in the information technology industry.

The systems integration orientation will strengthen Groupe Bull's image as a problem solver and business partner among clients and prospects. The move into systems integration is viewed as a positive move internally, since the systems integration market is a clearly defined, maturing market that has been profitable for the vendor community.

**Organizing for Systems Integration**

Jacques Weber elaborated on the organizational structure that has been implemented to pursue the systems integration market. It is a matrix

management concept designed to efficiently use Groupe Bull's technical strengths.

Systems Integration Business Units (SIUs), designated as profit centers, are being established in the U.K., Italy, France, Benelux, Germany, Scandinavia, and the U.S. They do not have engineering resources assigned to them, but actually subcontract with the Groupe Bull Project Management/Engineering Centers (PME) for the needed resources to accomplish the systems integration task. These PME Centers are located in the U.K., Italy, France, Germany, and the U.S. Once a systems integration opportunity is won, a contract director is named to assume full responsibility for the execution of the contract.

Exhibit 4 summarizes the role of the systems integration group within the larger Groupe Bull organization as outlined by Jacques Weber in his discussions with INPUT.

Exhibit 4

**Role of the Systems Integration Group**

- Provide strategic direction to SIUs
- Develop operating policies
- Support affiliates
- Develop internal skills
- Coordinate and build teams
- Establish worldwide partnerships
- Manage large multinational contracts

The SI Group's staff will be responsible for providing strategic direction and developing operating policies for all the SIUs. The group must formulate policies, identify the tools needed to resolve the

clients' problems, and solidify the management processes necessary to deliver systems solutions in a timely manner. Internal policies relating to risk management, progress reporting, quality assurance, and financial management are among those to be implemented at the group level.

The coordinating functions established by the SI Group will be dictated both by the company's international scope and the individual profit center structure of the SI organization. The group will provide overall support to the affiliates, will be responsible for skills development across the many individual units, and will build the worldwide partnerships that must be in place to supplement Groupe Bull's internal resources. Finally, whenever multinational contracts are required, the group will be responsible for executing and administering them.

## Partnership Management

Jacques referred to the term "partnership" frequently while discussing the strategy Groupe Bull has adopted for the SI market. INPUT has used the term "alliance" to describe the relationship between a vendor and those suppliers who supplement the vendor's capabilities to provide a full-service offering to its client.

Groupe Bull has evolved a more permanent concept for developing partnerships. The company plans to establish long-term, durable partnerships which will cover an extended time span. The relationship will not be opportunistic—that is, designed for a specific situation—but rather will be designed to let the partners work together jointly in R&D projects as well as in joint marketing and sales activities.

Jacques Weber expects the relationships to vary considerably in geographic scope, ranging from partnerships for specific countries to partnerships that span entire continents and even become worldwide in scope. The commitment of the partners will also vary across opportunities. For example, a vendor may be a subcontractor to Groupe Bull on one opportunity, and the same vendor may be the prime contractor on another opportunity, with Groupe Bull as a subcontractor. Both vendors are perfectly comfortable with either relationship if a truly durable partnership has been established. Exhibit 5 illustrates the types of firms with which Groupe Bull has established partnerships in national markets.

Exhibit 5

### Typical Groupe Bull Partnerships

Country	Partner Firm
U.K.	Logica British Telecom SD-Scicon Nucleus Technology
France	Andersen Consulting CAP Gemini Sogeti SEMA
U.S.	Deloitte Touche Nordata

### Typical SI Projects

Groupe Bull has systems integration experience in Europe that it can leverage to advantage because of its stature as a worldwide equipment vendor. Typical of its

broad experience are the projects listed in Exhibit 6. They represent the range of technologies that Groupe Bull—as a full-service systems integrator—provides, and the range of clients and applications it is capable of addressing.

## Business Objectives

Groupe Bull has very clearly defined the broad business objectives for the Systems Integration Group. The target is to win one out of every four bids at the start and

strive to improve that ratio to one out of every two as the SIUs' experience increases. Current (1990) revenue for Groupe Bull's systems integration activities, exclusive of the Honeywell Federal Systems Inc. revenue, is \$150 million. This represents less than 2% of the overall Groupe Bull revenues. The company has targeted its systems integration business to grow between 30% and 40% annually, and projects its SI revenues to be \$800 million to \$900 million by 1995.

Exhibit 6

### Typical Groupe Bull SI Projects

Client	Project	Technologies
Ansaldo (Italy)	Complete plant automation	UNIX TCP/IP MRP II X.25 Multivendor equipment
Dept. Social Services (U.K.)	Largest operational European OSI network	DSA/OSI X.25 ICL GCOS 6
Post Office (France)	Workstation network for Financial Services Department	UNIX LAN X.25
Superior Court (MA)	Automation	UNIX Multi-vendor equipment

This Research Bulletin is issued as part of INPUT's Systems Integration Program for the information services industry. If you have questions or comments on this bulletin, please call your local INPUT organization or Doug Wilder at INPUT, 1953 Gallows Road, Suite 560, Vienna, VA 22182, Telephone (703) 847-6870, Fax (703) 847-6872.

# About INPUT

INPUT provides planning information, analysis, and recommendations to managers and executives in the information processing industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Continuous-information advisory services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services (software, processing services, turnkey systems, systems integration, professional services, communications, and systems/software maintenance and support).

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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## Research

## Bulletin

A Publication from INPUT's Systems Integration Program

## Marketing Systems Integration—Lessons From the Service Sector

The systems integration market is energetic and still young. Organizations entering the market as well as those that have been around for some time are searching, some struggling, to identify the best organizational structure for marketing systems integration services.

This bulletin addresses structural changes that have been made to establish organizational elements dedicated to marketing and managing system integration opportunities, particularly in the commercial sector. It addresses the reasons that companies have established organizations dedicated to systems integration, why these structures have apparently not worked, and provides a number of recommendations for effective marketing of systems integration.

The primary purpose of this bulletin is to provide a historical perspective for vendors that may be considering establishing single organizations dedicated to marketing and supporting systems integration and to alert them to possible pitfalls. As some executives indicate, whether any given approach works is dependent as much on an organization's style as on its structure.

### Organizational Considerations

Organizations entering or seeking to enhance their position in systems integration must answer numerous questions regarding their strategy and approach. Among the key questions is: what is the right mix of resources and the right organizational alignment to successfully penetrate (or increase existing share of) the systems integration market?

Answers to the question are difficult to come by, if the changes in a number of large organizations are any indication. Another round of changes in organizational structure at IBM, Unisys, and AT&T (as examples), as well as experiences of organizations such as Boeing Computer Services, suggests several important considerations.

- First, systems integration, with its interdisciplinary, multiple product requirements, does not fit easily into traditional organizations. Systems integration products and services cross traditional organizational lines, often conflicting with traditional organization structures, lines of authority, and product/service focus. Careful consideration must be given to how to meld differing operational and marketing requirements.

- Second, public and private sector marketing approaches are not directly transferrable. Private sector marketing tends to be proactive. Public sector marketing tends to be reactive.
- Third, the incremental cost of a dedicated organization may be too high for many organizations to accept. While gross margins for systems integration may appear to be high, intense competition has tended to reduce margins and a company's ability to absorb large overhead. Related considerations include:
  - Systems integration sales expenditures are higher than for many information products and services. Projects are large, but projects can be few and far between.
  - Systems integration revenues (and profits) are realized over a longer period than product/service revenues.

The central approach was an attempt to leverage the expertise of federal marketing groups in bidding and managing large projects. But as many have found out, there is little real synergy between federal and commercial customers and marketing processes.

## New Not Always Better

To address systems integration opportunities, IBM, AT&T, and Unisys, among others, initially perceived that the best approach was to establish a new organization dedicated to marketing and supporting systems integration. In each case, the new organization would provide certain benefits, or so they believed.

Among much fanfare, each organization established new structures that were intended to provide several benefits.

- A single organization would provide a means of coordinating organizational
- lines and ensuring a single point of authority. A dedicated organization would be able to leverage and coordinate the wide variety of expertise needed to respond to systems integration requirements.
- A single organization would result in focused sales and marketing efforts that would reduce sales and marketing time and costs.
  - A dedicated organization would recognize the differences in investment and revenue requirements. Performance and compensation plans could be structured to acknowledge the differences.
  - A dedicated organization would be able to leverage federal expertise in responding to complex system specifications and management of large, complex projects.
  - A single organization would provide control over a new business that was perceived to have significant risk.
- A year or more after making announcements, further reorganizations have effectively done away with the large, centralized systems integration organizations. What went wrong? Conversations with corporate executives suggest several reasons for reversing their courses.
- Many organizations have found that the federal and commercial markets are sufficiently different that they cannot be effectively blended into a common entity. Federal organizations place great emphasis on a vendor's ability to meet detailed specifications. Commercial organizations place emphasis on a vendor's ability to provide solutions.
  - Large, centralized organizations resulted in incremental administrative functions,

creating added overhead. In this highly competitive market, the incremental costs are not affordable.

- In some organizations, conflicts develop over priorities. Products and services incorporated in long-term systems integration contracts effectively reduce near-term revenue potential for other products/services within the company. Sales organizations may avoid identifying opportunities in order to meet short-term sales quotas.
- With a potentially large, dedicated marketing organization, conflicts arise over marketing responsibilities and territories. Sales costs increase and coordination among different sales organizations becomes difficult.

Although little public note has been made, large organizations have seemingly concluded that separate, large, centralized organizations dedicated to commercial systems integration just do not work.

Comments from executives suggest that centralized approaches to marketing and managing systems integration opportunities and contracts do not work. INPUT believes, however, that the issues may be related more to the differences between product- and service-oriented companies than to their actual organizational structures. Consider these of key differences between product (hardware/software) and service companies:

- Product (hardware/software) companies are frequently more rigid in their approach to marketing. They are frequently constrained by their interest in selling more equipment (theirs) and are less flexible in considering alternatives to meet a customer's requirements. Service companies do not have the same constraints. Their interest is in melding a variety of products and services to provide creative solutions.

- Product-focused companies have extensive product and technical knowledge. The same companies often lack the ability to develop a comprehensive understanding of customer problems and assess solution alternatives. Service-focused organizations are more oriented to analyzing problems and evaluating and developing creative solutions.
- Product companies are frequently less flexible than service companies. Service companies have experience in meeting a diverse set of customer requirements and have experience in adapting to differing situations. Product companies have a tendency to mold standard and more rigid solutions to fit their products.

Difficulties faced by product companies may also be faced by service companies heavily oriented to the federal government. As Boeing Computer Services has found, processes used to manage federal projects are not readily adaptable to the private sector. The federal sector demands extensive, highly detailed data to meet mandated reporting requirements. The private sector relies more on results-oriented reporting, requiring detailed data where it makes a contribution to managing the specific project.

## Approaches That Work

Executives indicate that they are uncertain about the type of organization that is best to tap into the systems integration market. However, experience of executives that have been closely involved in developing marketing strategies for systems integration indicate several points.

- Sales personnel must be focused on solution selling and closely attuned to the individual client's needs. This is best accomplished by applying the existing

field sales force to systems integration opportunities.

- Sales organizations must be trained and given incentives to identify and pursue systems integration opportunities. Sales staff must understand the complexity of systems integration and knowledge of how the company can respond to opportunities. Sales incentive plans should be focused on revenues derived from the entire project rather than commissions from specific products.
- Project management and implementation need to be located close to or on the commercial client's site. Commercial clients usually like to be close to project activity.

- Project decisions must be made quickly. Tedious, bureaucratic processes often present in large equipment organizations are not effective in a results-oriented project environment.

In a market where service and flexibility are key elements to success, large hardware and software companies have been struggling to find the best organizational formula. Recent changes suggest that the lessons are being learned and that organizations are establishing a closer linkage between customer needs and their strategic objectives.

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## Research

## Bulletin

A Publication from INPUT's Systems Integration Program

### Systems Integration: Subcontracting to Client Integrators

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The systems integration market is a hotbed of vendor activity. It provides information services vendors with an opportunity to expand their market penetration and protect their revenue base by positioning themselves as "full service" suppliers to their clients.

Opportunities develop as buyers look to systems integrators to help them deploy technology quickly in response to changing business conditions or to gain a competitive advantage. The SI vendor has to be ready to provide the total solution to the business problem and, increasingly, is expected to assume some degree of risk for timely, successful delivery of the final product.

INPUT forecasts that systems integration revenues will reach \$7.5 billion in 1991, growing at a compound annual growth rate of 19% through 1995. This makes it one of the fastest growing delivery modes in the information services industry.

The \$7.5 billion represents revenues that SI vendors earn for managing systems integration projects for client firms in the U.S. It does not represent all the systems integration activity in the market,

however. Another set of systems integration projects is being managed by the clients themselves. Thus, there are both internally and externally managed components in this market.

What is the size of this secondary market? Though it is widely considered larger than the externally managed SI market, its characteristics are not well known.

Internal systems integrators still have to purchase hardware and software from vendors. They may still supplement their own staffs by subcontracting some of the integration activities to external vendors. How do buyers decide which suppliers to use for these products and services? Are vendors that are prominent in the externally managed systems integration market also prominent in this secondary market, or is a different set of vendors involved?

INPUT is currently conducting research to examine the characteristics of this market and determine its size. Both vendors and users will be contacted to gather data on this market. The actual research methodology will be discussed below.

## Objectives of the Study

There are four primary objectives of this study as currently planned. These are illustrated in Exhibit 1.

The size and the makeup of this market may be considerably different from the primary SI market. For one thing, buyers are generally seeking to supplement their own internal capabilities and need only a subset of the services normally provided by an SI vendor.

Companies that choose to do their systems integration projects internally may require different services from the vendors they use for equipment, software and professional services. How these companies decide who will provide these services and how they manage their relations with those vendors will affect how potential vendors approach this market.

Though the case may be made that the major equipment vendors will be in the secondary market, there appears to be significant opportunity for smaller professional services firms and niche players to participate in this market.

In addition to determining the current size of this market, it is important to assess trends and forecast how this market will change in the coming years. Since this market has several subcomponents, it is important to assess how each will change over time.

## Scope of the Study

The report will examine the U.S. commercial information services market as it exists today. All services that are provided to an internal information

Exhibit 1

### Objectives of Subcontracting Study

- Identify market characteristics
- Compile data on selection and management of vendors
- Identify firms operating in this market
- Forecast the size of this secondary market

services organization to assist in the integration activities of that organization are included. Specifically excluded are services that can be clearly identified as strictly of a professional services nature and are not related to a buyer's internal systems integration activities.

Also excluded are systems integration projects that are totally outsourced to and managed by a vendor under a prime contract. That activity is covered in INPUT's analysis of the primary systems integration market.

## Use and Purpose

Current systems integration vendors will want to assess the potential of this secondary market, since they already have the services and skill sets in place to serve this market. Some may already be providing these services on a subcontracting basis but need help to measure the potential market size. Others may not have opened marketing channels to this client base and need the assessment of its potential to justify changing their strategies.

Potential systems integration vendors may find this secondary market to be the ideal arena in which to test their marketing

skills and take their first step into the primary systems integration market. It may also provide smaller potential SI vendors an opportunity to enter the market.

## Methodology

The study will be conducted in two phases, as illustrated in Exhibit 2.

In Phase 1, firms will be contacted that had indicated to INPUT in earlier surveys that they were managing systems integration projects with their own internal staffs. A telephone questionnaire will be used to solicit information from these firms on a number of topics such as:

- Whether or not they subcontract portions of these internal projects
- What motivated them to subcontract parts of those internal projects
- How they evaluated and selected the vendors they used

Data will also be collected on the future plans of these firms, to assess the growth trends in this market.

Firms will be contacted in at least five vertical industry markets to assure a broad cross-section of viewpoints.

In Phase 2, vendors will be contacted that are either current providers of systems integration services or have been identified in the Phase 1 survey as prominent in providing services to information services departments that assist internally managed systems integration projects.

Telephone interviews will be conducted with these vendors to determine if they approach the secondary market any differently and what they see as the

Exhibit 2

## Study Design

Phase 1—Firms with internally managed SI projects

- Solicit information on:
  - Subcontracting to vendors
  - Reasons for subcontracting
  - Evaluation of subcontractors
  - Management of subcontractors

Phase 2—Systems integration vendors

- Solicit information on:
  - Approach to secondary market
  - Market potential

growth potential for their services in this market.

## Report Contents

The resulting report will follow the outline presented in Exhibit 3. The intent is to present a clear assessment of the market characteristics and the potential in this secondary market for subcontracting to client integrators.

The report will be organized in the following manner:

- Chapter I, Introduction, will identify the objectives and the scope of the report. It will also review the research methodology.
- Chapter II, Executive Overview, will provide a convenient summary of the contents of the report. It will be structured to highlight the major findings of the study.

## Exhibit 3

## Outline of Report

- I Introduction
- II Executive Overview
- II Market Forecast
- IV Market Characteristics
- V Market Trends and Issues
- VI Vendors and Their Characteristics
- VII Conclusions and Recommendations

integration market. The evolution of the vendor/client relationship will also be examined.

- Chapter VI, Vendors and Their Characteristics, will identify the prominent vendors in this market and group them according to focus or discipline. Vendor options and strategies identified in the study will be discussed.
- Chapter VII, Conclusions and Recommendations, will review the major findings of the report and draw conclusions from them. Recommendations will be included for vendors currently in the market and for those considering entering this market.

## Report Distribution

- Chapter III, Market Forecast, will project the revenues for this secondary market based on INPUT's knowledge of the primary systems integration market coupled with INPUT's analysis of the user and vendor responses concerning trends in this secondary market.
- Chapter IV, Market Characteristics, will assess the user requirements as reported by respondents to the survey, and compare these to vendor capabilities identified during Phase 2 of the survey.
- Chapter V, Market Trends and Issues, will look at the market drivers and inhibitors at play in the market and will assess the impact of these on the growth of the internally managed systems

A report entitled *Systems Integration: Subcontracting to Client Integrators* will be prepared presenting the results of this study by mid-1991. As with other reports in the Systems Integration Program, the results of the user surveys will be published as soon as that part of the report can be prepared, and the entire report will be published upon completion of both phases of the study.

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## Research Bulletin

A Publication from INPUT's Systems Integration Program

## Systems Integration Market—1991-1996

### Introduction

Systems integration continues to grow and is not only a significant source of information services revenue, but an important distribution channel for information products.

While much industry attention has recently been focused on the market for systems operations, the systems integration market continues to thrive.

Although systems integration will continue to be important, there are signs of possible change. Whether the change is fundamental, an indication that the industry is maturing, or only a reflection of current economic conditions are questions that will be addressed in INPUT's forthcoming report, *U.S. Systems Integration Market, 1991-1996*.

Among the changes is the recognition that the commercial and federal systems integration markets are considerably different. Within the last year, Boeing Computer Services exited the commercial systems integration market and NYNEX has apparently concluded that the commercial systems integration market has a higher degree of risk than it cares to accept.

After much fanfare to establish integrated (federal and commercial) marketing

organizations, IBM and Unisys have each reversed their course, placing greater attention on being closer to the customer.

Other recently completed INPUT research suggests that technology, particularly new technologies such as CASE, UNIX, and client-server architecture, may not be as important to growth of the systems integration market as some vendors have thought.

Research indicates that the importance of technology is relative. Users consider technology important, but indicate only limited interest in initiating systems integration projects to deploy technology. Their primary interest is in solutions to business problems, not the technology used as part of the solution.

In addition to these changes in perception, economic conditions have had an effect on the rate at which new systems integration projects are begun. Companies in several leading systems integration industries indicate that they have delayed projects due to economic conditions.

The delays may have affected the growth of the systems integration market, but the apparent slowdown may also have had beneficial side effects.

Among the positive side effects may have been an opportunity for corporate

executives to evaluate exactly how technology can best contribute to corporate growth.

Some suggest that they are most interested in solutions that contribute directly to the core business processes. Some also suggest that systems integration is leading to a re-engineering of corporate business processes. New, integrated, systems permit more efficient and cost-effective methods of conducting business. This can be a much greater benefit than just delivering more information more cost effectively.

INPUT's soon-to-be-completed report, *U.S. Systems Integration Market, 1991-1996*, explores the state of the systems integration market in light of the economic conditions and changes that may be taking place in the information services industry.

## Scope of Study

INPUT's analysis of the systems integration market focuses on several factors important to vendors entering or expanding in the systems integration industry.

- The potential for systems integration opportunities is analyzed in the federal and 14 commercial markets.
- The forces in each of these markets that contribute to the potential for systems integration opportunities are analyzed.
- The impact of industry forces on information systems organizations in each of these markets is analyzed.
- Potential for systems integration opportunities is analyzed and a market forecast is presented.

- Forces driving the systems integration markets and factors that inhibit higher growth rates are analyzed.
- Specific attention is given to differences between the federal and commercial systems integration markets.
- A market analysis is prepared for the period 1991-1996.

Exhibit 1 summarizes the 15 industry sectors analyzed in INPUT's report on the systems integration market.

Exhibit 1

### Systems Integration Vertical Markets

- Banking and finance
- Discrete manufacturing
- Process manufacturing
- Education
- Insurance
- Medical
- Retail distribution
- Wholesale distribution
- State and local government
- Telecommunications
- Transportation
- Utilities
- Business/technical services
- Federal government
- Miscellaneous

Source: INPUT

## Use and Purpose

Information in the report is important to vendors entering or seeking new areas of opportunity for systems integration.

- The report identifies major trends in information systems and the use of systems integrators in each vertical market. Understanding trends contributes to developing sound marketing strategies.
- The report identifies major competitors and the types of services provided. Understanding who competitors are helps develop competitive marketing strategies.
- The report provides a market forecast for each vertical market. The forecast contributes to understanding revenue potential from each vertical market.
- The report provides information about how to be successful in marketing systems integration services. Success factors can be different for different vertical markets.

The report provides valuable information for strategic and tactical market planning.

## Report Contents

An outline of the report is presented in Exhibit 2. The intent of the report is to

present a comprehensive analysis of the systems integration market, noting changes that could affect short-term and long-term opportunities.

- Chapter I - Introduction - identifies the objectives and scope of the report and outlines what is to follow.
- Chapter II - Executive Overview - provides a summary of the research findings and key conclusions and recommendations.
- Chapter III - Market Analysis and Forecast - provides a comprehensive analysis of systems integration and forecasts expenditures for the coming five years.
- Chapter IV - Vertical Industry Markets - provides an analysis of systems integration market opportunities in each of 15 vertical market sectors.
- Chapter V - Market Strategies and Recommendations - provides information about success strategies in marketing and sales, preparing systems integration bids, project management requirements, and containing risk. This chapter also summarizes a number of recommendations for vendors entering or expanding in the industry.

Exhibit 2

### Systems Integration Market Forecast Table of Contents

I	Introduction
II	Executive Overview
III	Market Analysis and Forecast
IV	Vertical Industry Markets
V	Market Strategies and Recommendations

Source: INPUT

# About INPUT

INPUT provides planning information, analysis, and recommendations for the information technology industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

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Particular areas of expertise include CASE analysis, information systems planning, and outsourcing.

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A Publication from INPUT's Systems Integration Program

## Systems Management Priorities and Directions

One of the most significant trends in the information services industry over the last decade has been the increase in vendor management of user information systems activities. Users have demonstrated need and willingness to contract systems development and operations management. Vendors stepped up to the challenge and are providing quality management services.

INPUT initiated a study to examine the changes in user priorities regarding the use of these and other vendor-managed information services. This study will also identify and examine major trends and directions in this evolving market. In addition to the two more popular services, systems integration and systems operations, the study also focuses on management of the client's application inventory.

In the mid-1980s, systems integration became a popular vehicle that internal IS and user organizations used to contract implementation of major systems. SI offered several benefits to the buyer, including availability of experienced program management skills, personnel that were trained and skilled in the implementation of new technologies and a means of accelerating project implementation. In most cases, the vendor

assumed technical and financial risk for the success of the project.

In the late 1980s, interest increased in outsourcing systems operations and fundamental changes occurred in the way this service was viewed by buyers and sellers. An outgrowth of the old facilities management offering, systems operations is a broader offering in which the vendor takes operational responsibility for management planning and control of the majority of the user's information processing activities. The vendor is assuming more risk, and there is more focus on a vendor-client partnership.

Systems operations can take either of two forms. The vendor can either provide platform services with the user retaining all responsibility for the applications maintenance and development, or the vendor can provide applications services where it supports platform services and also manages the maintenance of the applications inventory.

In addition to systems integration and systems operations, there appears to be an evolving service opportunity in the area of applications management. A number of vendors are offering ongoing application management services, either bundled with SI or SO, or separately.

The objectives of Systems Management Priorities and Directions are to determine:

- If user attitudes are changing regarding the use of vendors to manage both systems development and systems operations
- What users' plans and priorities are regarding transfer of applications management to a vendor—as an element of a systems integration or systems operations contract or as a standalone applications management contract
- Vendor plans, motivations and attitudes for providing a full range of management services

INPUT selected this topic for study because it is apparent that more vendors are offering a broader range of services that cover the full range of IS activities. For example, EDS has a systems management service in which it offers to take over all of a user's information systems functions. Other vendors, such as IBM, Andersen Consulting, CSC, and Digital, are offering services to accomplish most, if not all, of the IS activities currently accomplished with internal staff.

INPUT is studying this area to provide comprehensive data and trends that will assist vendors in developing strategies to compete in this evolving market.

Some of the issues being addressed in the ongoing study include:

- What are the forces driving or inhibiting U.S. companies in contracting systems management activities to vendors?
- Will user companies seek different vendors for different management

activities, or will they seek a single vendor?

- What types and sizes of organizations are candidates for total systems management services?
- Will systems management be focused in a few vertical industries or be sought by all industries?
- Will the applications management component of systems management focus more on maintaining packaged software or on client-specific customized code?
- What are the forces driving vendors to provide additional information services management offerings?
- Who are the major vendors offering systems management services? What are their apparent strategies?

To examine the issues described above, INPUT has already interviewed user companies to gain the views of internal IS management. Vendor interviews are also underway to gain vendors' perspectives on systems management.

INPUT anticipates that this study will be concluded in June 1991. It will be delivered in sections as they are completed.

INPUT believes systems management will play a larger role in U.S. industry. More and more companies will decide that internal IS organizations should focus on planning the strategic application of technology to internal business problems. At the same time, many companies will decide that it is more effective to outsource the management of day-to-day activities to information services vendors. INPUT believes that ongoing research will support this view.

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# INPUT<sup>®</sup> Research Bulletin

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## Systems Integration—An Evolving Industry

There was a time when organizations would no more consider turning over management of systems development to a vendor than they would consider turning over their core business processes. Just as times have changed, the systems integration market is maturing, and the profile of a typical project is changing.

### Changing Market Conditions

INPUT's analysis of the 1990 systems integration market indicates that there are a number of changes taking place. The changes may bode well for smaller, niche providers that have in-depth understanding of a particular business. They may have significant impact on vendors that are highly technically oriented, and they may directly affect the way systems integration services are sold.

Exhibit 1 summarizes key reasons for changes that have been taking place over the past year or two. Unless the economic environment changes significantly over the next year, INPUT expects that these considerations will become increasingly important to marketing strategies for at least the next two to three years.

Few organizations would argue that systems and networks have become a

#### Exhibit 1

### Systems Integration Market Key Change Reasons

- Increased core business focus
- Early benefits payback
- Smaller project size
- Shorter project duration

Source: INPUT

necessity for business survival. Most would also agree that systems can provide a competitive advantage, but investments in new systems and technology has been severely strained by economic conditions. Reduced revenues, shrinking profit margins, and a lack of investment capital have caused senior executives to re-evaluate how they will allocate dwindling pools of funds.

Information systems executives in leading industries indicate quite clearly that increasing attention is being given to enhancing the organization's core business processes. They recognize that new technology and techniques can provide methods to gain competitive advantage, but believe that improvements must be

made in core business processes before the value of sophisticated technologies can be realized.

For example, executives in the retail industry recognize that technologies such as geographic information systems can enhance their understanding of buying patterns and product preferences. They recognize the value in quickly and easily seeing shifts in buying patterns, as compared to having to analyze huge quantities of data produced by older systems.

They also recognize that unless they can capitalize on the information, they will not fully realize a return on their investment. Before investing in new technologies, they must be able to control factors such as shelf time, delivery time, and inventory. Many recognize that their older systems do not permit timely analysis of key financial performance factors.

Similar situations are found in other industries. In manufacturing, primary interests are focused on improving the cost effectiveness of production operations. Growth of products and services such as CAD/CAM systems and electronic data interchange (EDI) suggest that organizations are more interested in improving basic processes than in investing in projects that integrate organization-wide processes.

Focus on the core business is contributing to other changes in the systems integration market. Specifically, organizations are looking for earlier payback on their technology investments than they were in the past. This has led to projects that are smaller in size and shorter in duration.

## Changing Project Characteristics

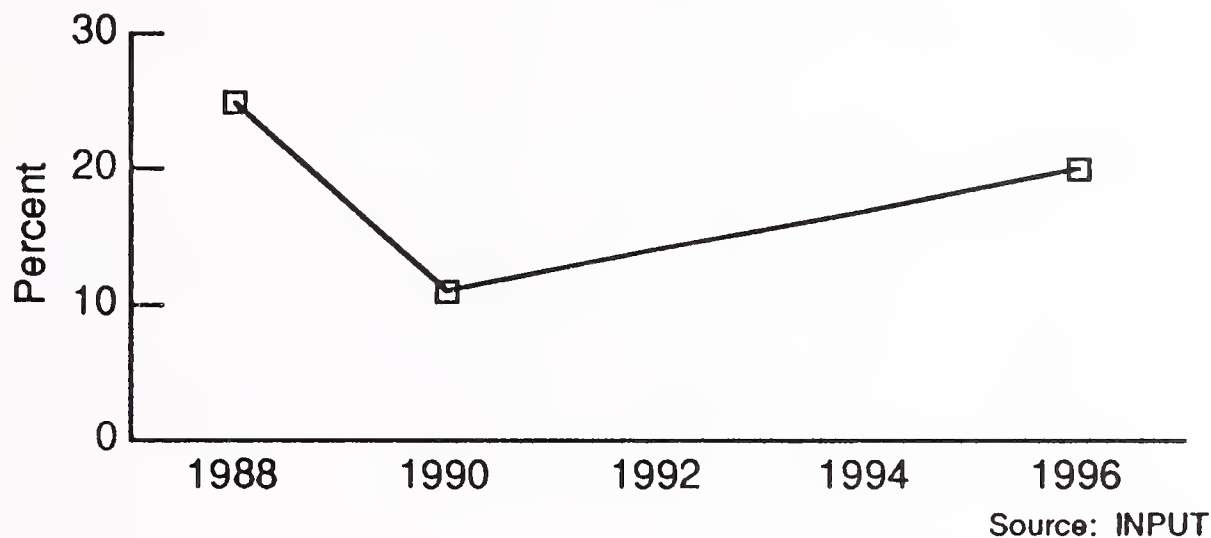
A key characteristic of early systems integration projects was that they were very large and performed (frequently) over three to five years. In projects of this duration, some benefits might be realized early, but major benefits were frequently not realized for at least the first two to three years. Today, benefits need to be realized early to offset some of the investment costs. There are still large projects that extend four to five years, particularly in the federal government, but the need to realize short-term benefits has led companies to define smaller, shorter term projects that are more targeted to specific (operating) problems.

In INPUT's analysis of the 1990 systems integration market, all responding companies indicated that their projects were less than two years in length. Half indicated that their projects lasted less than one year.

The reduction in length has contributed to a reduction in the value of projects. Unlike in the past several years, when a number of very large projects tended to drive the average project value up, only one project was identified that exceeded \$100 million. There were several that were in the \$10 to \$20 million range. The majority were less than \$1 million. The result is that the average project value has declined to \$3 to \$4 million, a reduction of 30% over the past several years.

Exhibit 2

### Systems Integration Market Growth Rate Trends



### Growth Rate Trends

The systems integration market exhibits many of the characteristics of a market that is maturing and whose economic conditions are subject to change. As shown in Exhibit 2, the rate of growth approached 30% in 1988. Some industries exceeded even that by a considerable amount, but since then the rate of growth has slowed.

- In 1988, the systems integration market was forecast to grow at 25%. The growth rate for a number of industries exceeded 35%.
- By 1990, the market growth decreased to 17% and is now forecasted to increase at 19% over the next five years. Not only is this significantly down from previous years, but it does not truly reflect the impact of the economy in the near term. Between 1990 and 1991, the market is expected to grow at only 12% and a number of industries will be in the 10% to 11% range.

The trends reflect both a poor economy and a maturing of the industry.

- Poor economic performance has significantly impacted the rate at which companies initiate new projects. One large manufacturing company noted that it currently has 12 systems integration projects approved but is not able to move forward due to lack of funding.
- Many companies have revised their thinking about the size and duration of projects, indicating a sign of maturity. While they tended to initiate major, long-term projects with expectation of large returns in the past, they are now defining projects that are smaller, yielding earlier returns targeted at specific problems. They are not trying to solve all problems at one time.

INPUT believes that the growth rate of the systems integration market will rebound and could reach a 20% growth rate several years from now. However, for many, project emphasis may shift somewhat.

- Companies do recognize that major changes are needed in their core operational processes and that systems integration projects can contribute

significant changes and benefits. As with the manufacturing company noted above, many companies have projects approved for which they need funding. Once the economy picks up, the rate of new project initiation should increase.

- Continued increases in the growth rate are expected for the next several years, but rates in excess of 30% (for some industries) appear to be a thing of the past. Growth rates in the upper teens and low twenties are expected as companies leverage systems integration projects to change the way they do business.
- INPUT expects that the greatest growth will result from companies that use systems integration as a means of re-engineering their basic business processes. However, the higher rates of growth will not be achieved if focus remains on just the technology.

Severe economic conditions have impacted the systems integration industry, just as they have impacted other industries. Assuming a reasonable rate of recovery, INPUT expects the systems integration market to rebound to a reasonably strong rate of growth.

More importantly, projects may be more targeted to helping organizations conduct their business more efficiently, not just fixing systems. The result should be a stronger market and a greater contribution to business processes.

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## State Government Information Systems— EBT To The Rescue

As most people who don't live in California, and some that do, will tell you, California is a strange place. It's a cacophony of different ways of thinking and varied life styles and a leader in high technology and (beach bum) drop-outs. If it were a country, California's economy would rank seventh in the world.

As a user of information technology and services, California represents the best and the worst. In 1990, the state's budget for information technology topped \$1 billion. The state has sophisticated data centers, is developing a comprehensive statewide digital network, and is conducting a pilot project for an interdepartmental electronic imaging system. However, underlying this high-tech sophistication is the fact that many of the state's systems are old and rely on extensive use of manual interaction and intervention to ensure that delivery of public services will continue.

Using California as an example, the purpose of this bulletin is to characterize difficulties that states have (or will have) in the application of new technologies to meet future needs. The bulletin considers the information systems environment in California (as an indicator of difficulties in many state governments), an approach that INPUT believes many states will pursue to meet future service delivery needs, and areas of vendor opportunity.

### State Government Environment

As users of information technology, state governments are somewhat unique. Unlike commercial organizations and the federal government, state governments are subject to a greater number of conflicting pressures and influences.

Commercial organizations must continually make decisions about the allocation of funds to meet competitive needs. Investment may be a necessity to achieve an objective, but decisions about objectives and priorities are generally within the control of management.

As a public service organization, the federal government must deal with numerous conflicting pressures from a wide variety of interests. Funds are limited, many information systems requirements result from legal mandates and cannot be changed, and staffing levels cannot be easily reduced.

Like the federal government, state governments must meet legally mandated requirements. Here, funds are also limited and staffing levels cannot be easily reduced. State governments must respond to similar levels of special interests. But state governments are subject to additional pressures and requirements.

Unlike the federal government, which can change regulations and laws, states must abide by federal as well as state laws. Federally mandated requirements cannot be changed. State plans to develop new systems are frequently altered, sometimes quickly, to respond to federally mandated requirements. Regulations promulgated by federal departments can result in changes to entire systems.

In addition, because they are "closer to home," state government processes are more visible. The federal government, by virtue of size and distance, is removed from scrutiny. Public frustration that frequently should be directed at federal processes and controls is directed at states. The heightened visibility makes states less able to make investments. Public groups view investment funds as money that should be distributed directly to the public.

Until recently, the federal government provided financial assistance to states for the development and implementation of systems and processes that were mandated by federal laws or regulations. This has changed dramatically as the federal government has experienced increasing financial pressures. Over the past several years, the federal government has reduced its funding assistance to states for systems development by as much as 35%. Financial assistance for ongoing, federally mandated operations has been reduced by as much as 75%.

The cutbacks could not have come at a worse time. As with the federal government, many states are at or near fiscal crisis. California had to resolve a projected \$14 billion funding shortfall for the upcoming fiscal year. Many states face similar fiscal difficulties. The effect has been to significantly reduce spending commitments at a time when states are in need of major overhaul of many of their information systems.

## State Information Systems

In 1990, California's spending for information systems was projected to be \$630 million, 1% of total projected state-

wide spending of \$66 billion. This excludes telecommunications and capital spending not charged to operating budgets. (Note that spending has been assumed to be equal to receipts—i.e., revenue—since California has a legal requirement for a balanced budget.)

Taken at face value, this would be considered a low level of spending by most industry standards, but this does not reflect true spending. An estimated 17% of the state's spending is through internal transfer, one department paying for services received from another. After accounting for internal transfer, the actual level of outside spending is closer to 0.8% of total spending. (In the commercial sector, some companies spend between 4% and 6% of revenues on information systems.)

In 1990, the state had 5,900 (person-year equivalent) personnel in information systems, which included a large number of staff dedicated to performing manual operations. Approximately 36% of the state's information systems spending is for personnel, as compared to the commercial sector, where personnel can represent up to 60% of costs.

On the surface, the data suggests that the state is doing a good job by keeping its information systems costs down. Careful analysis indicates that this may be false.

States, in fact, are faced with a dilemma. They recognize the potential value of technology. They would like to be able to reduce dependence on personnel, but are not able to make the investments to reduce staffing levels. And, while a substantial portion of personnel costs go for performing manual tasks, restrictive practices frequently preclude the use of automation to replace personnel.

At the same time, California allocates as much as 70% to 80% of its development costs to maintaining older systems. When only 1% or less of revenues is allocated to information systems, there is little opportunity for major systems efforts.

Many states face the same dilemma California faces. How can they improve systems and reduce dependence on manual processes while making little investment?

## Revolution, Not Evolution

Considerations by California and plans by a number of other states suggest that many may bypass the process of investing in major rewrites of large, centrally oriented systems and move directly to electronic interaction with benefit recipients.

Arizona, Arkansas, Kansas, Michigan, New York, and Wyoming are either planning or piloting systems to permit benefits recipients to apply for and receive services and benefits through direct, electronic interaction with state systems. Many suggest that electronic benefits transfer (EBT) will result in significantly reduced costs and better control over benefits processes.

Electronic benefits transfer is in its early stages, and the best approach to its implementation remains to be determined. One project uses debit-type cards that access automated teller machines (ATM) to disburse cash for the payment of goods and services. Another project uses a similar approach, but goods are dispensed only at participating food and medical outlets. States using this approach suggest that they have better control over goods and services received.

Another approach uses smart cards. Recipients receive a card with a predetermined spending limit. Each time the card is used, an amount is deducted from the total, until the total amount is used.

States piloting the use of EBT suggest that it could reduce processing costs by as much as 60%, as well as improve control, but a

major problem prevents most states from realizing the potential of this type of technology. In many states, the health, social, and employment service departments are separate, and each has its own systems, which do not interact. Many suggest that EBT systems cannot be truly successful until benefits can be coordinated across departments.

## Trends and Opportunities

Assessment of difficulties that exist in many states, and analysis of industry trends toward greater electronic interaction, suggest opportunities for vendors in two major areas.

States are only beginning to venture into the arena of electronic benefits delivery. The processes are complex and few states are familiar with the many technical and operational requirements. Vendors experienced in electronic delivery systems (EFT, POS, and ATM) could find a growing market. Of particular importance to states will be understanding customer interface requirements. States that have been satisfied with 95% system uptime and response times of two to three seconds may experience great difficulty in delivering electronic benefit services.

States will also need to begin to integrate data bases across department lines. Just as merchants would not contend with multiple point-of-sale terminals (for credit card authorizations) on their counters for very long, carrying multiple EBT cards will not be acceptable to the public.

The market opportunity will grow slowly for the next two to three years, providing ample time for vendors to establish credentials or alliances. Following that time, significant opportunities should begin to emerge.

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## Subcontracting to Client Systems Integrators

The client-managed systems integration market is widely considered to be larger than that of vendor-managed projects. INPUT research suggests that client expenditures for internally managed projects was three times the \$4.4 billion spent for vendor projects in 1991. Under favorable conditions this secondary market could grow at a compound annual rate of 15%.

Despite this attention-getting growth, INPUT's survey indicated that an average of only 19% of the internally managed project expenditures go to outside vendors.

Client integrators continue to be skeptical about the use of vendors, and reluctant to give control of critical system changes to outsiders. Vendors have not convinced clients to any significant extent that they can provide better alternatives. And when they do, vendors are generally viewed as being more expensive, except when skills provided are not available internally.

Because client integrators want to minimize subcontracting risks, they prefer vendors with whom they have prior experience, unless they need newer technology or different applications experience. At best, the selection process is based on subjective assessment of vendor capability.

## Reasons for Outsourcing

Vendors will be sought by client integrators to participate in their projects for a variety of reasons, as illustrated in Exhibit 1.

Respondents closely ranked the first three, with emphasis on maintaining or restoring implementation schedules. This exhibit also compares current and future projects.

Respondents cited staff supplementation as a primary reason for subcontracting. Acquisition of vendor-provided skills also accelerates the implementation of a project. Note, however, that the interviewees expect greater importance to be given to staff supplements and additional skills from vendors on future projects.

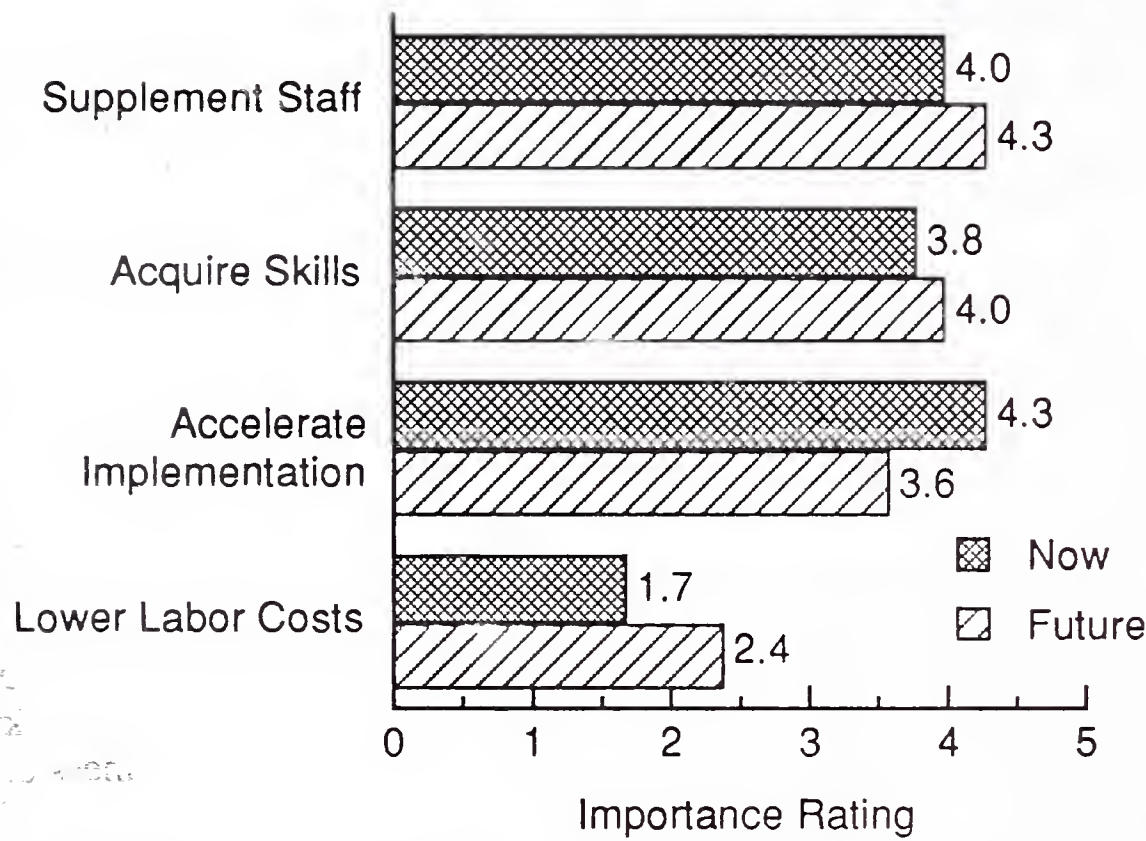
Implementation acceleration is seen as less important for the future, on the presumption that scheduling will improve with experience.

Internal SI managers, however, do not generally consider the use of subcontractors to be cost effective. This is markedly different from those who outsource their business information processing. It is surprising to see that lower labor costs are expected to become more important in future projects.

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Exhibit 1

Comparison of Reasons for Outsourcing  
Current vs. Future Projects



Rating: 1 = Low, 5 = High

Source: INPUT

Most SI projects require the acquisition of varying amounts of equipment and software products, generally from outside suppliers, without regard for who manages the projects. Emphasis was placed on professional services tasks in examining the most likely kinds of activity. The relative number of responses for the more significant tasks are displayed in Exhibit 2.

Software development leads because it frequently involves special skills not readily available in most organizations, and at a level less likely to be needed after implementation is

Component Expenditure  
Distribution

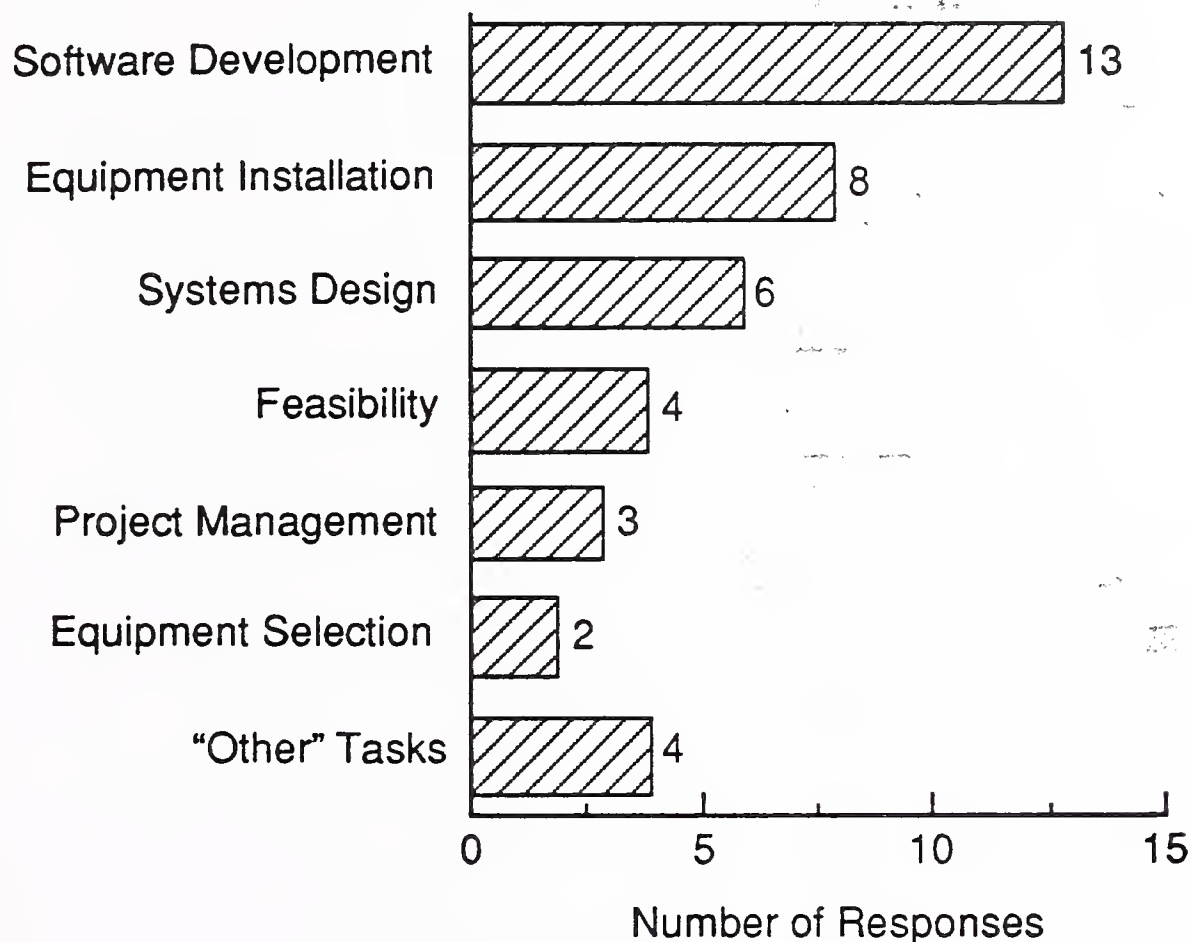
Component	Client-managed (Percent)	Vendor-managed (Percent)
Professional Services	55	53
Equipment	30	36
Software Products	15	8
Other Services	—	3

completed. Equipment installation is needed where geographic dispersion of distributed systems is involved, and users are not likely to be able to perform the functions. Installation of LANs and client/server systems were identified as subsets needing outside specialists.

Currently, those interviewed generally did not subcontract project management activities. The exception now is for complex replacement systems. Some did indicate consideration of vendor-managers for newer technologies.

Exhibit 2

### Potential Tasks to Subcontract



Source: INPUT

Some support elements—for feasibility studies, equipment selection and acceptance testing—are employed where the current workload is high.

### Subcontractor Selection Criteria

Subcontracting support to client integrators is selected for a variety of reasons, most of which are subjectively assessed. Two-thirds of those interviewed said that the procurement was based on either previous experience of the IS department or recommendations of the user department. Exhibit 3 shows the ratings of the criteria most often used.

Except for special technical skills, the first four criteria clearly illustrate the relative importance of familiarity of the client with the potential vendor. This explains why certain equipment

and software products vendors gain strong market shares through longstanding client relationships.

Application knowledge and special technical skills have high secondary appeal. Vendors with experience are sought by the client integrator with major integration challenges. Industry knowledge does not appear to be as critical to in-house managers who know their business best and rely on vendors only for specialized, often industry-independent skills.

The most frequently mentioned criterion in the "other" category is training, which might be product-specific, or for special skills on PCs, workstations or data bases.

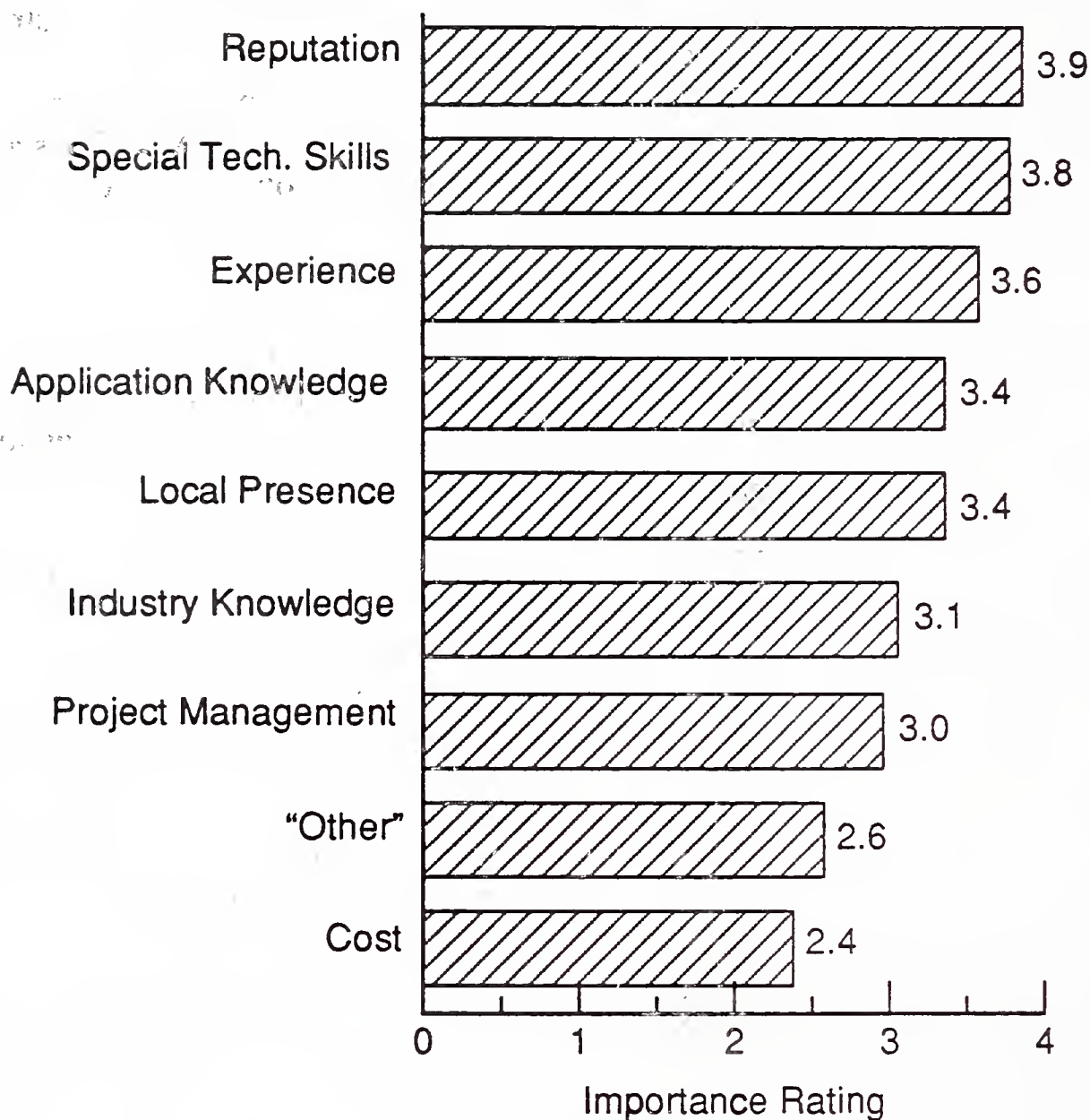
The last criterion was consistent with INPUT's findings on the reasons for outsourcing—cost is not highly rated. The client integrator is more concerned with completing the project than doing it at the least possible cost.

### Subcontracting Vendor Characteristics

One measure of vendor participation in this market is the portion of SI revenues generated in the secondary market. While some vendors do not aggressively pursue secondary opportunities, others consider contracts in this

Exhibit 3

## Vendor Subcontractor Selection Criteria



The unlisted category is equipment manufacturers, who generally leave client integration to VARs or the other vendor types. IBM and DEC are prime examples of vendors who have restructured to address the gamut of systems integration and outsourcing activities, along with a wider range of other information services activities. There is no way at this time to separate subcontracting revenues from the whole of their SI activities.

Full-service vendors, like CSC, EDS and PRC, do not participate aggressively in this secondary market. They will accept engagements where they anticipate

market an important part of their total systems integration revenue.

There is insufficient data to identify the market leaders because of definitional problems and the wider range of vendors participating in the market. It is useful, therefore, to classify them in more traditional supplier categories in order to look at strategies and potential revenue contribution from the secondary market. Exhibit 4 lists all but one of the conventional vendor types and revenue ranges that show significant variability of responses.

future prospective business. This market represents less than 5% of their revenue, so they do not track the subcontracting separately.

The "Big 6" firms generally have a larger consulting and strategy component than do full-service vendors. Respondents indicated that more than 50% of their SI business involves close work with clients, so that much of their revenue is in the secondary market. At least one said that the client is generally responsible for project management.

Exhibit 4

**Vendor Revenue Contribution**

Vendor Type	Revenue Range (Percent)
Full service	1 - 2
Big 6	60 - 80
Other professional services	10 - 30
Platform/systems specialists	10 - 15
Applications specialists	20 - 40
Other	20 - 30

Source: INPUT

vendors. The second class usually has a base of knowledge or a software package specific to an industry or cross-industry function. Policy Management Systems, Information Associates and Decision Focus are typical of this class.

The "other" category includes engineering firms like Fluor Daniel and Harnischfeger, and vendor consortia like U.S. Connect Partners and the "Chicago Six." The latter exemplify an emerging trend of alliances between smaller, regionally based vendors.

Other vendors are primarily custom software developers that are being asked to take on SI tasks because of client organization familiarity. Examples include TSC, Keane Associates, Business Systems Group and Lante Corp., all of which have become more active in the secondary market.

Technical specialists are smaller vendors with established niches in the SI market based on implementation of particular platforms or industry applications. They rely on their reputation in the user community to develop new business. Dickens Data Systems, Network Management, Inc. and Evernet are examples of platform/systems specialists. Some of these have or are developing alliances with larger SI

**Conclusions**

Clients still want to exercise control, but need technical skills to satisfy the demands of complex projects. Although significant potential is implied, the market size and specifics are not well defined. Where the need to meet schedules or acquire expert assistance is urgent, users are not cost sensitive.

Vendors can capitalize on technical niches and specialized industry experience. Expansion to national coverage as well as a wider range of available services can come through growth or effective alliances. Building on existing client relationships continues to be a strong strategy.

This Research Bulletin is issued as part of INPUT's Systems Integration Program for the information services industry. If you have questions or comments on this bulletin, please call your local INPUT organization or Alan Nilsen at INPUT, 1953 Gallows Road, Suite 560, Vienna, VA 22182, Telephone (703) 847-6870, Fax (703) 847-6872.

# About INPUT

INPUT provides planning information, analysis, and recommendations for the information technology industries. Through market research, technology forecasting, and competitive analysis, INPUT supports client management in making informed decisions.

Subscription services, proprietary research/consulting, merger/acquisition assistance, and multiclient studies are provided to users and vendors of information systems and services. INPUT specializes in the software and services industry which includes software products, systems operations, processing services, network services, systems integration, professional services, turnkey systems, and customer services.

Particular areas of expertise include CASE analysis, information systems planning, and outsourcing.

Many of INPUT's professional staff members have more than 20 years' experience in their areas of specialization. Most have held senior management positions in operations, marketing, or planning. This expertise enables INPUT to supply practical solutions to complex business problems.

Formed as a privately held corporation in 1974, INPUT has become a leading international research and consulting firm. Clients include more than 100 of the world's largest and most technically advanced companies.

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# INPUT<sup>®</sup> Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

## Vendors Learn from Successful Integration Contracts

The following is a preview of the research presented in INPUT's new report, *Methods of Successful Systems Integration*.

Vendors surveyed for INPUT's recent study, *Methods of Successful Systems Integration*, report that coming to agreement with their customers (users) on requirements and realistic expectations continues to be the biggest stumbling block in achieving success on a project.

Getting around this obstacle is not always easy, especially when one or both parties view the situation as adversarial.

As shown in Exhibit 1, communication between the vendor and the customer is central to clarifying requirements and building a working relationship between vendor and customer.

For commercial clients, the vendor usually takes on the task of attempting to clarify customer requirements and acceptance criteria. It is to the vendor's advantage to straighten out any misunderstandings of requirements, because a dissatisfied customer may default on the contract.

Conversely, federal contracts tend to be more explicit in defining functional and technical specifications, leaving little room for the vendor to offer alternative solutions.

### Exhibit 1

#### Communication Fosters

- Understanding of customer needs and requirements
- A framework in which to develop mutual trust
- Visibility of cost, schedule and technical performance issues

Mutual trust develops between two parties through repeated exchanges of information. Often vendors want to be included in discussions of their customers' systems problems and business directions. Non-expressed customer agendas and needs become apparent to vendors through frequent interaction. Vendors who achieve a business partner-like status with their customers will improve the likelihood of successful contracts and will build solid reputations.

An atmosphere of mutual trust is also enhanced when communications between the two parties are not restricted to a single point of contact for

each side. Because of the size and complexity of many systems integration (SI) projects, vendor project teams need direct access to the customer organization, including the ultimate end user. The usefulness of a single point of contact in both the vendor and customer organization is usually limited to contractual issues and signatory authority.

Vendors report that when communication channels are open, it is easy for both sides to bring up and resolve cost, schedule and technical performance issues.

INPUT's research reveals additional lessons learned by vendors (see Exhibit 2).

Exhibit 2

### More Lessons

- Avoid fixed-price contracts
- Use formal management tools and processes
- Improve subcontractor management

The majority of buyers and most federal contracting officers prefer fixed-price contracts. This type of contract is usually inappropriate for customers and vendors in the systems integration market. Systems integration is a "service" deliverable, not a commodity item. Obtaining clear requirements and final acceptance criteria from the customer prior to contract award is virtually impossible.

Because SI is a service, changes will occur during the contract's duration. Vendors are

restricted in how they respond to customer requests for change when an inflexible fixed-price contract is in place. Ultimately this will affect customer satisfaction with the finished system.

In a fixed-price contract scenario, the vendor bases the proposal on requirements as "they are known." A profit margin is also built into the price proposal. Small changes often add up, and can significantly impact a vendor's profitability and the project schedule. Vendors are refusing to perform SI services under fixed-price conditions because it has become a no-win situation. In the past, vendors often sacrificed profits to keep their customers happy.

Most vendors rely on formal management tools and procedures to control systems integration projects because of the complexity and number of vendor and customer personnel involved in these projects. Vendors advocate using formal risk management and change control procedures. Both techniques minimize surprises for the vendor and the customer throughout the SI process.

Vendors in INPUT's study also stressed the importance of subcontractor management. The Statement of Work (S.O.W.) and the final contract document should clearly delineate the subcontractor's roles, responsibilities and expected measures of achievement.

Subcontractors are increasingly required to share the risks assumed by the prime contractor.

How and when communication occurs between vendors and their SI customers has a direct impact on producing a successful contract for both parties. Other issues also play roles in creating an environment geared toward success. Flexible contracts, the use of formal management tools and processes, and the prime contractor's strict control over subcontractors are equally important.

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## Successful Systems Integrators Tell the World

The most successful systems integrators have corporate initiatives that promote open communication about systems integration programs. There is a direct correlation between the willingness of a company to provide information and that company's success in the SI market. Of course, it does not follow that just having open communication will make a company successful. A company must first have successful SI programs before it can publicize them.

As a result of contacting many systems integration companies for case studies and vendor profile information, INPUT has found a direct correlation between the openness of a company and success in this market. Successful companies take every opportunity to promote their offerings.

In requesting information for case studies for presentation at INPUT's recent systems integration conference, INPUT found that the most successful companies had already synopsized their SI programs for internal use and selective sales/marketing activities. Although the level of detail and orientation of the information varied, the purpose of each

company was the same: to inform the market about the company's experience and capability through example. These companies were very willing to share these case studies with INPUT and even with potential competitors who attended the conference.

Conversely, a few companies declined to present case studies for consideration and were not interested in speaking opportunities. These companies were in the distinct minority.

The successful companies use a multipronged attack in accomplishing this communication:

- Media/consultant point of contact—The largest companies have established a point of contact responsible for media relations and providing information to industry consultants. Smaller companies can be successful by including the media/consulting community on their mail lists for annual reports, press releases, analysts' briefings, white papers, etc. Some companies retain public relations firms to help them deliver their message. Even among the smaller companies there are great differences in the provision of information.

Exhibit 1

**IT Industry Associations**

- |               |          |
|---------------|----------|
| • ITAA/ADAPSO | • IEEE   |
| • EIA         | • FUGIPI |
| • ACM         | • CBEMA  |
| • CCIA        | • AEA    |
| • DPMA        | • PSC    |

Source: INPUT

- Trade associations—The information technology industry, vertical industries and application areas all have allied trade associations. They present opportunities for participation, committee activities, presenting papers and speaking engagements.
- Trade press—The media is continuously seeking qualified authors for articles. There is substantially more benefit in having an article published than in a paid advertisement.
- Management—All management in any company should accept the responsibility to promote that company's activity in the SI markets. There are numerous examples in which the first lead for an SI program came from a casual airplane or dinner conversation. Managers should not overlook briefing their own employees and providing them with summary literature.
- Technical—SI often involves solving technological problems. Promotion of the company's ability to provide those solutions can lead to additional SI engagements.

- Technical personnel are notorious for not seeking speaking opportunities or documenting their successes.
- Encouragement of the technical staff to promote their successes can lead to more business.

The argument against providing information is that it will then become available to a competitor. In today's information society, most of that information is already available to a competitor. A company should consider, if the information were available to a competitor, what realistic adverse action that competitor could take and what the damage could be.

Every company has some information that should be aggressively safeguarded. This policy should be adaptive to each market segment. For example, in some industries client lists are very sensitive. But consider the SI market. It would be very unusual for an SI program to be suspended and awarded to a competitor. If an SI contractor has performed satisfactorily, it is virtually impossible to separate it from an account. There is very little adverse risk in disclosing information about existing or completed programs. Successfully completed programs or programs in process are highly referencable and disclosure will lead to far more business opportunities than negative impacts.

Conversely, proposed programs or those in a study phase are ultra-sensitive and should be jealously guarded. These will become large SI programs in later years and are the plums that every competitor would like to pick.

Some companies that specialize in classified defense SI programs have developed a very secretive corporate culture. These same companies are having difficulty transferring their experiences into commercial opportunities. Although this element of secrecy is only one variable in a complex equation, it certainly adds to the problem.

In the past, some companies such as Andersen Consulting and EDS would have been included among those with secretive attitudes! Now these same companies have people dedicated to keeping the market informed using the above techniques. IBM and EDS encourage all levels of employees to speak in public forums.

Systems integrators are dependent on subcontractors and alliances to satisfy the complex needs of their clients. Closed companies find it more difficult to establish and maintain these alliances. A secretive company causes concern among its subcontractors. These are truly relationships and communication improves any relationship.

Although some companies do not discourage their employees from promotional activities, they have policies that make it so difficult that most employees decide not to try. Burdensome policies that require all speeches and papers to be written or reviewed at a corporate level or multiple levels of authorization, or require involvement by the public relations department, tend to dampen the enthusiasm of potential participants.

INPUT recommends that SI companies re-examine their own operations to determine if they are effectively promoting their own SI capabilities, experiences and successes. Companies that are not using internal and external resources to pursue all avenues to publicize programs are not realizing the full benefit of their successes.

## Mark your Calendar for INPUT's 1992 Conferences!

- Outsourcing Information Systems Program Conference—*Getting Down to the Nuts and Bolts*—will be held September 17 and 18, 1992 at the Ritz-Carlton Hotel in McLean, Virginia.
- 1992 U.S. Executive Conference will be held October 4, 5, and 6, 1992, at the Fairmont Hotel in San Francisco, California.

For more information contact Barbara Fisher, Conference Coordinator, (703) 847-6870.

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INPUT is a worldwide consulting and market research firm uniquely focused on the information technology services and software markets. Executives in many technically advanced companies in North America, Europe, and Japan rely on INPUT for data, objective analysis, and insightful opinions to support their business plans, market assessments, and technology directions. By leveraging INPUT's considerable knowledge and expertise, clients make informed decisions more quickly, and benefit by saving on the cost of internal research.

Since 1974, INPUT has compiled the most extensive research base available on the worldwide information services market and its key segments, providing detailed market forecasts, vertical industry sector analysis and forecasts and analysis of vendor strategies and products. INPUT delivers specific expertise in

the fast changing areas of outsourcing, systems integration, EDI/electronic commerce, software development/CASE, and on the impact of downsizing.

Consulting services are provided by more than 50 professionals in major international business centers. Clients retain INPUT for custom consulting/proprietary research, subscription-based continuous advisory programs, merger/acquisition analysis and detailed studies of U.S. federal government IT procurements.

Most clients have retained INPUT continuously for a number of years, providing testimony to INPUT's consistent delivery of high-value solutions to complex business problems. To find out how your company can leverage INPUT's market knowledge and experience to gain a competitive edge, call us today.

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# Research Bulletin

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A Publication from INPUT's U.S. Systems Integration Program

## SI Users Match Vendor Program Management Techniques

The following is based on the research presented in INPUT's new report, *Methods of Successful Systems Integration*.

Research conducted by INPUT in early 1992 shows an increase in the involvement of client companies in SI program management. User organizations are now approaching SI contracts from a program management perspective. Previous INPUT studies had shown users in a less involved role, while a contractor performed SI services.

The new posture of users is basically attributed to previous experiences in SI relationships, or the desire of users to have more influence over the final solution.

Users realize that vendors could fail to fashion a satisfactory solution if they receive only specifications from the user organization.

Although vendors may have considerable experience in a customer's business, it is difficult for an outsider to develop a custom solution with little input from the client. A client has first-hand knowledge of his industry and company. The vendor needs the customer's participation in the solution.

To help assure that SI contracts are managed to the user's best advantage, 80% of users expect their program managers to have the same or equal qualifications as those of the program manager appointed by the vendor (see Exhibit 1).

Exhibit 1

### Customer Program Manager Qualifications

Compared to Vendor's Program Manager	Percent of Respondents
Same	80
Different	13
Don't know	7

Source: INPUT

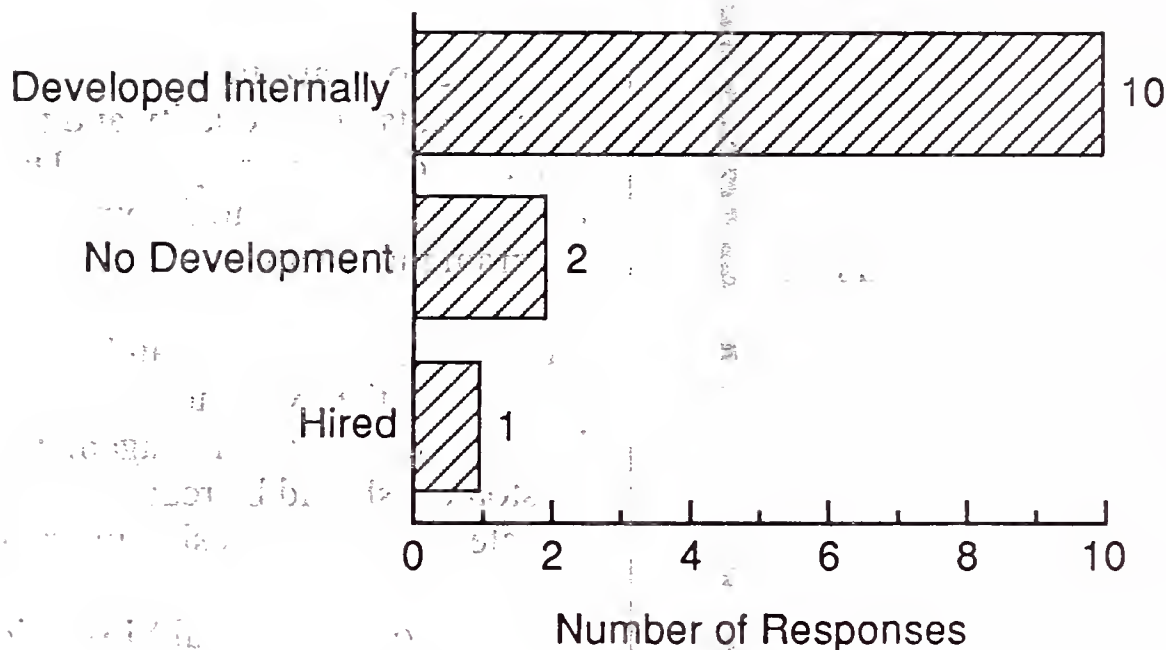
The customer's program manager oversees the vendor's adherence to the contract. This person is responsible for the customer's interface to the vendor organization, and directly interacts with the vendor's program manager.

Although users admit it is usually an impossible task to find individuals of program manager caliber within their companies, they rarely hire from the outside, as shown in Exhibit 2.

Due to the size and complexity of many SI engagements, it is necessary to have a formal system to track problems and ensure that they are resolved.

Exhibit 2

### Customer Program Manager Development Methods



Source: INPUT

User companies are trying to cultivate career paths for individuals who exhibit program manager potential. However, at this time, seminars and on-the-job experience provide the bulk of the preparation given to user program managers.

The formal processes applied by the majority of users in this study to manage their interface with SI contractors are listed in Exhibit 3. Many of these are commonly referred to as risk containment/management procedures.

The user interface organization employs budget controls during the course of an SI contract to monitor the vendor's progress. Careful monitoring of the allocated budget compared to the schedule milestones of deliverables can signal problems in the system when they occur.

As a result of problems and additional requirements, the customer may recommend changes to the solution the vendor is developing. Both organizations establish change management systems to monitor and control changes during the course of an SI contract. Many customers adopt or adapt their vendor's change management process to audit the vendor's change management progress.

Extensive contract administration is usually only necessary if progress payments are included in the contract.

Although education and training components of SI contracts are common, customer organizations are usually involved in providing detailed and ongoing training to end users. Vendors normally develop training materials,

## Exhibit 3

### Customer Program Management Procedures

- Budget control
- Problem ID/tracking
- Change control
- Contract administration
- Education of buyer/end users
- Prepare integration plans to existing systems
- Internal quality reviews
- Progress reviews

Source: INPUT

offer initial training services, and train the customers' instructors.

The majority of user organizations in this study also developed plans to integrate the SI deliverable into their existing systems. The SI solutions often incorporate portions of existing systems. In these situations, impacted work flow processes are re-engineered by the user organization.

Customer organizations make their own assessments of the quality and progress of the vendor's developing system. These reviews are considered essential components of SI program management.

Obviously, the scope of an SI contract determines the extent to which customers implement program management procedures. Customers should be ready to modify and initiate procedures as situations evolve.

The path to a successful SI solution is easier when customers monitor vendor processes through their own program management procedures, and work with the vendor toward their common goal.

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# Research Bulletin

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## Courts Integration: Developing a Business Partnership Is the Keystone to Success

The following is adapted from a presentation given by Larry Maloney, Program Manager, IBM Corporation at INPUT's 1992 Systems Integration Conference, July 21, 1992.

IBM Corporation is in the process of completing a statewide case and cash management system for the Administrative Office of the Pennsylvania Courts. The new system connects and integrates the administrative procedures at 540 district justice offices. The resulting information system is designed to mirror how district justices performed their administrative processes manually. Automated processes were non-existent in many of the offices.

Although this project is acclaimed as successful by both IBM and a pleased Pennsylvania Courts System, its implementation is instructive to all systems integrators.

The overall strategy used by the Administrative Office of the Pennsylvania Courts (AOPC) to approach court systems integration is shown in Exhibit 1.

The new court automation system required expeditious case tracking at all judicial levels. This is a typical court system

functional automation requirement. In addition, all members of the judiciary needed connection to a network because of the rising complexities of the litigation process. Fragmented systems and "pens and typewriters" do not constitute an efficient administrative environment. All members of a judiciary need to communicate with each other and often track the same cases and individuals.

### Exhibit 1

#### SI Court Systems Master Plan

- Expedite case tracking at all levels
- Connect all judiciary via network
- Interface state and federal agencies
- Enhance office productivity
- Secure public records access

Source: INPUT

Interfaces were needed to other state and federal agencies, such as the motor vehicle department and revenue collection agencies. The automated tracking of fines and fees is also expected to generate funds to finance the automation of additional court functions.

Obviously, security of court records is vital in a networked environment to safeguard the individual rights of defendants and expedite tracking of offenders.

As most systems integrators know, problems are encountered that potentially can jeopardize the completion schedule and budget. Some of the problems encountered on the Pennsylvania District Court contract are listed in Exhibit 2. They are common to many SI projects.

When vendors and customers work together at the customer's site it is not uncommon for a culture clash to develop between them. Vendor personnel are accustomed to working in their corporate environment, which invariably functions differently than the environment of the client. Procedures and expectations are different.

Bankruptcy of a subcontractor is occurring more frequently. Small niche service or product subcontractors are increasingly going out of business as a result of the U.S. economic downturn.

A subcontractor may also fail to meet budget and time schedules due to any number of factors, such as poor project management, or a lack of financial and people resources.

If key hardware does not have Underwriters' Laboratories approval, the length of the approval process may have a significant impact on the contract's delivery schedule.

An incomplete design causes customer distrust of the vendor. However, incomplete designs are often the result of unknown or incomplete specifications from the customer.

It is the integrator's responsibility to ensure that specifications are complete, and to obtain written agreement from the customer on specifications. Without this agreement, it is difficult for the vendor to develop an accurate schedule.

Contracts usually spell out acceptable performance criteria expected from deliverables. If the performance criteria are too explicit, the vendor is limited in

Exhibit 2

### Problems Encountered

- Vendor and customer culture clash
- One subcontractor went bankrupt
- Failure of a subcontractor to deliver component backup system
- Essential hardware not approved by Underwriters' Laboratories
- Incomplete design
- Insufficient time allowed for change following pilot systems
- Performance criteria not suitable
- Customer underestimated data usage

Source: INPUT

the type of final solution that can be delivered. The vendor needs flexibility to adapt to unfolding requirements and the problems inherent in systems development. Ultimately the users will not be satisfied with a system that is not reflective of their needs.

Underestimates of data usage can significantly impact the pricing, schedule, and software and hardware requirements of an SI solution.

The key lessons learned by IBM that can be applied to future SI contracts are shown in Exhibit 3.

IBM's culture clash with the Pennsylvania Courts was eased by building a relationship based on mutual trust. This process is not accomplished in a day, but by repeated interchanges and the vendor's demonstration of professionalism and genuine interest in providing a satisfactory solution. Working with end users through each step of the process is essential. This approach helps to develop a partnership with the customer. Customers do not necessarily believe that vendors are on their side. Often in SI relationships the customer views the vendor as an adversary. It is up to the vendor to take the necessary steps to correct this perception, and help build a joint partnership with the customer.

The ultimate success of the contract depends on a working and flexible relationship between the two parties. Issues regarding performance criteria, milestone dates and requirements will invariably surface and need to be resolved.

Exhibit 3

### Lessons Learned

- Build and keep customer's trust
- Develop partnership with customer
- Provide full-time project management for each key area
- Agree on management tools
- Agree on change control procedures
- Develop quality standards for all parties involved
- Qualify subcontractors financially
- Qualify subcontractors technically
- Qualify subcontractors' project management skills
- Ensure that subcontractors are financially committed to performance criteria
- Have contingency plans for all subcontractors
- Maintain the right to remove any person or subcontractor
- Ensure that all equipment meets standards
- Do a gradual turnover of key processes
- Keep all vendor personnel at one location

Source: INPUT

Another way a vendor eases culture clashes is by demonstrating project management skills to the customer. In addition, obtaining customer agreement on management and change control procedures will help cement the working relationship.

The vendor must also develop quality standards for his organization and subcontractors with specific measurements and tools identified.

An experienced SI contractor will guard against subcontractor mismanagement or failure.

Subcontractors should be qualified financially and technically. A subcontractor's references should be checked to verify technical capabilities. Investigation of subcontractors' project control procedures should be performed. Subcontractors that make a financial commitment to meet performance criteria, usually do:

The SI contractor should reserve the right to replace any subcontractor or person involved in a project for non-performance. Backup subcontractors and internal staffers should always be kept in mind.

Selection of equipment that meets approved industry standards helps meet schedule commitments. Additional risk is inherent in selecting modified or newly developed equipment.

Development of a plan delineating how and when the transition of deliverables, including project control, will occur is essential to assuring customer acceptance. A gradual turnover of processes to the customer allows time for education, and re-education on automated work processes.

For large SI engagements in particular, it is easier for the SI contractor to manage a diverse staff and the staffs of subcontractors if everyone is contained in one location. Communication is facilitated, and project management procedures are easier to implement.

1992 U.S. Executive Conference will be held November 1, 2, and 3, 1992, at the Fairmont Hotel in San Francisco, California.

For more information contact Glenna Nathans at (415) 961-3300.

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# Research Bulletin

A Publication from INPUT's U.S. Systems Integration Program

## The Lagging Economy Hits SI Growth

The prolonged economic slowdown has negatively affected the potential growth rate of systems integration (SI) programs. Faced with a sluggish business environment and an uncertain future, some buyers are delaying the start of large SI programs. Others are adapting to smaller, more modular approaches with lower initial investment and faster payback. The slow economy has increased competitive pressures for most companies. These pressures are forcing companies to focus on their core business and added value.

Many companies are using technology to gain competitive advantage by reducing costs, providing superior service, expediting product development, and improving quality and productivity. These new solutions are becoming increasingly complex as they facilitate new business processes and serve new organizational structures. In most cases, companies do not have the internal skills necessary to design and implement these systems. Exhibit 1 synthesizes the major 1992 buyer issues.

An increasing amount of information systems expenditures are no longer exclusively controlled by the internal information systems organizations. In many cases the user organizations are demanding and funding their

Exhibit 1

### Buyer Issues—1992

- The economy
- Core business functions
- Competitive demands
- Increasingly complex solutions
- New technology applications
- Unavailable skills

Source: INPUT

own systems. The decision to use an outside vendor to provide systems integration services has become more of a business issue and less of an information systems issue.

Many of the solutions that users need include new technologies such as artificial intelligence, image processing, downsized systems, and a wide variety of advanced telecommunications

alternatives such as LANs, MANs, and WANs. System integrators with a good track record provide an attractive alternative to internal information systems organizations that lack adequate resources and skills to meet new user requirements. Some internal organizations also lack the applications knowledge and experience in new technologies that is required.

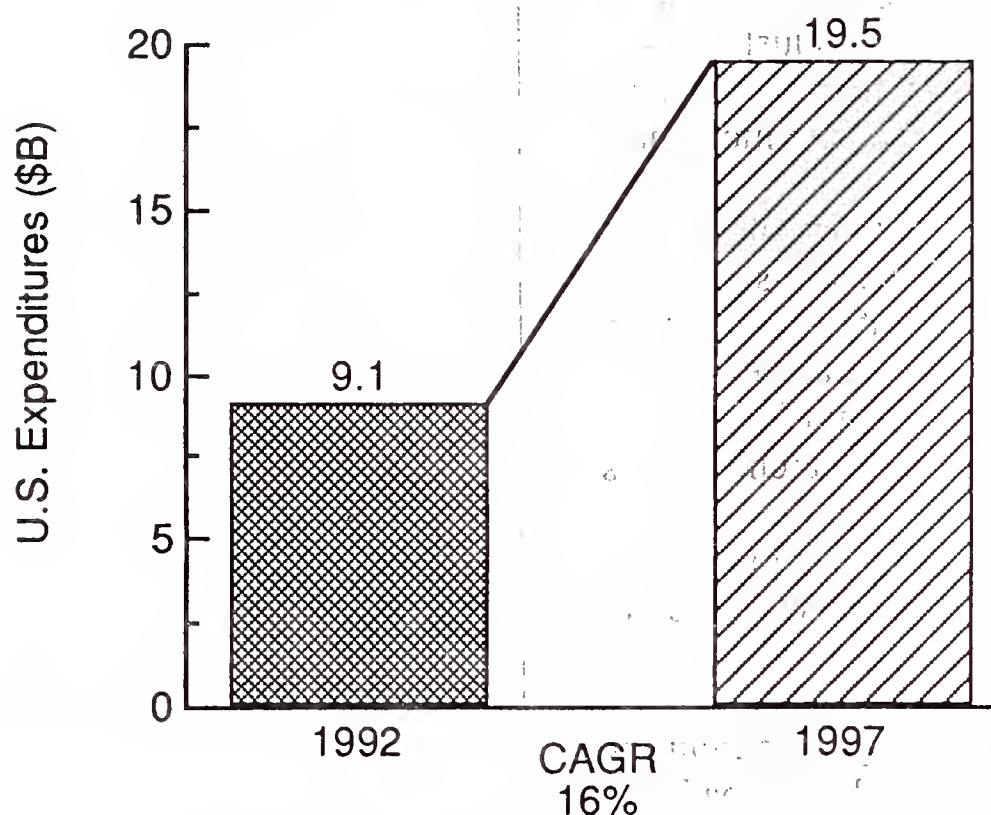
Exhibit 2 shows the systems integration forecast for 1992-1997.

The federal government component continues to decline as a percentage of the total and will represent \$3.7 billion in 1992 growing to \$6.4 billion in 1997, a CAGR of 12%. The commercial segment will grow from \$5.4 billion in 1992 to \$13.1 billion in 1997, a CAGR of 19%.

The second largest vertical market is discrete manufacturing. INPUT forecasts this market to grow from \$1.3 billion in 1992 to \$3.5 billion

Exhibit 2

### Systems Integration Market



Source: INPUT

In 1991 companies actually invested 1% less in industrial plant and equipment than in 1990. With inflation under 4%, the forecasted growth rate of 16% still represents a healthy 12% real growth. INPUT expects the systems integration market to grow from \$9.1 billion in 1992 to \$19.5 billion in 1997.

in 1997. This growth rate of 21% is slightly lower than the one previously forecasted, but still represents exceptional opportunity.

Shifts in project size and project value and the impact of technological and economic pressures has brought the forecast for the SI market more

in line with the overall growth of the information services industry, at least for the short term.

In the long term, INPUT expects the systems integration market to rebound and outpace the overall market, but significant changes should not be expected until economic confidence has been restored and companies are more disposed to make additional investments. This forecast, more so than in the past, is highly dependent upon, and sensitive to, economic conditions.

The SI market varies greatly by vertical industry. The federal sector was the leader in the industry. But the budget deficit, defense cuts, and shifting priorities have all led to reduced growth in this market segment. The attractiveness of other vertical industries is directly proportional to how much they have been affected by the current economic situation.

Vendors recognize the importance of understanding their client's business, particularly in an environment where long-term relationships are important. To achieve this goal, SI vendors are making significant investments in industry-specific architectures and solutions, hiring industry experts, and establishing alliances with consulting firms or professional service firms that have industry expertise.

The larger vendors that already have industry coverage have established goals to broaden their SI vertical industry coverage to protect their existing customer relationships. Smaller vendors are honing niche skills and gaining market coverage through alliances with larger vendors who seek these specialized vertical industry skills.

A growing number of secondary vendors are seeking participation in vertical markets. Many have products that were previously sold as standalone systems but are now candidates for integration into larger solutions. These products include basic computing equipment as well as robots, intelligent material handling equipment, on-board computers, and a variety of communications products. Other secondary vendors seeking SI participation include companies that have developed solutions internally and want to market these skills and capabilities to others in their industry.

This Research Bulletin is issued as part of INPUT's U.S. Systems Integration Program for the information services industry. If you have questions or comments on this bulletin,

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